DUST PREPARATION FORM

CLIENT: Law Atlanta
MAS JOB NUMBER: M 13824
TYPE OF SAMPLES: DUST
PREP TECH: Amazzalerro
DATE OF PREP: 9/14/95
DUE DATE: / /
PREP METHOD: MT - 003 # 1
FILTER TYPE / SIZE: Gelman MCE 47 mm
FILTER AREA:
PORE SIZE: .45 µm
FILTER BOX NUMBER: Lot 4120801

SAMPLE NUMBER	CLIENT I.D.	VOLUME FILTERED NO. 1	VOLUME FILTERED NO. 2	VOLUME FILTERED NO. 3	VOLUME FILTERED NO. 4	TOTAL SUSPENSION VOLUME	COMMENTS
M13824-1	1	.1 ml	.6 ml	.02 ml	.05 ml	100 ml	Grid Box 3496
2	2	.02 ml	.1 ml			"	"
3	3	.02 ml	.1 ml	.005 ml	.01 ml	"	"
4	4	.02 ml	.1 ml	.005 ml	.01 ml	"	"
5	5 Field Blank	30 ml	—	—	—	"	"
Lab Blank	9-14-95	30 ml	—	—	—	"	3522
							Grid Box 3557

Reprep Request

Project: M13824 Date: 9-18-95

mple #	Original Volumes	Re-wicks	More Grids	Volumes Requested
1	0.4, 0.6			0.05, 0.02
3	0.02, 0.1			0.01, 0.005
4	0.02, 0.1			0.01, 0.005

Prep Tech: Carrafero
Date: 9-19-95
Grid Box: 3557
Tracking Log Updated: /
Original Prep Sheet Updated: /

MATERIALS ANALYTICAL SERVICES FRI 22-SEP-95 09:54
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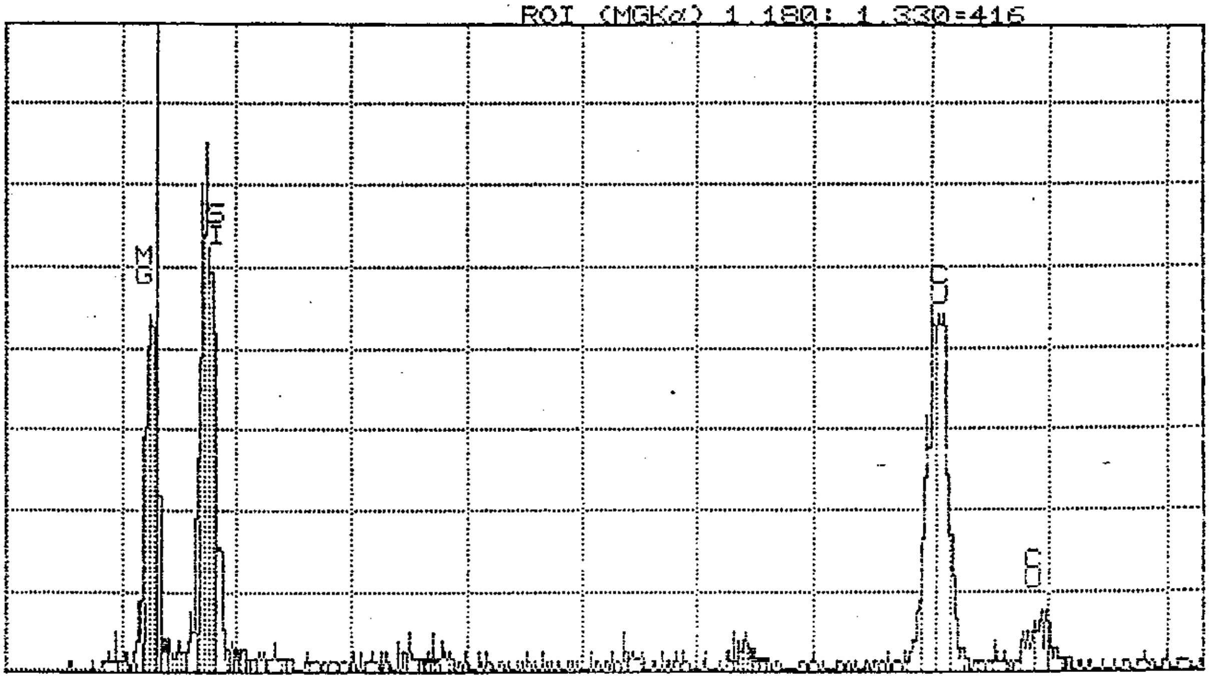
ROI (MGKα) 1.180: 1.330=416



0.000 VFS = 64 10.240
18 M13824-1 , CHRYSOTILE

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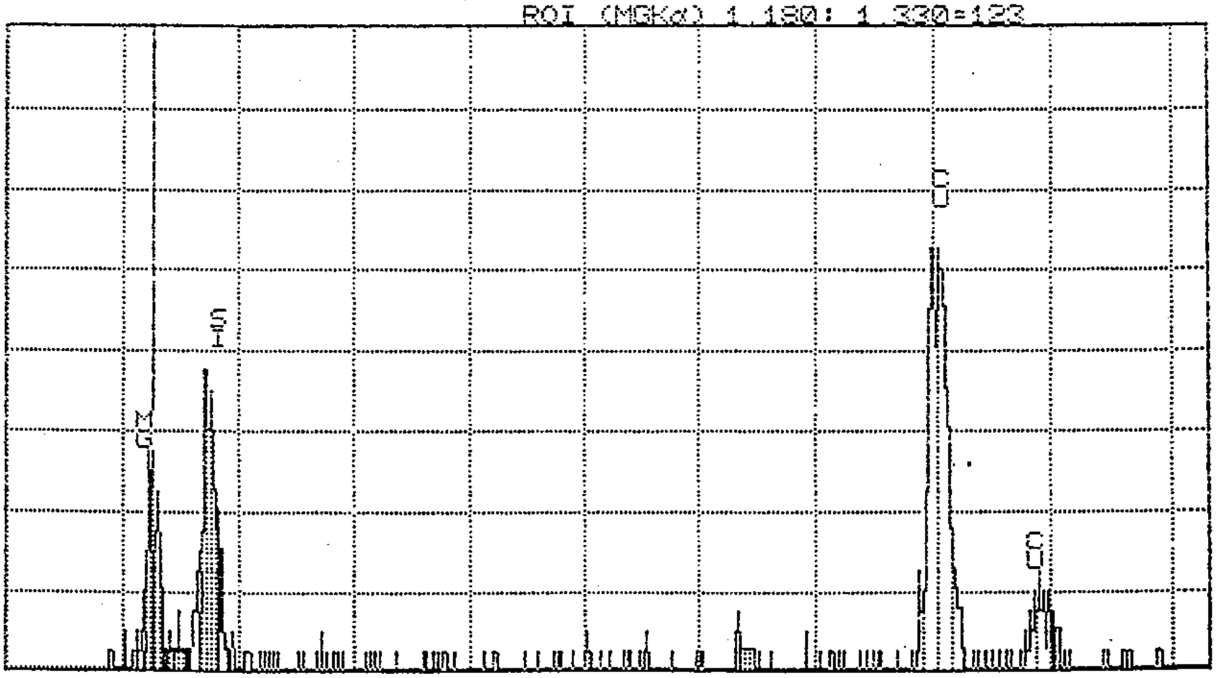
ROI (MGKα) 1.180: 1.330=123



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9 M13824-1 , CHRYSOTILE

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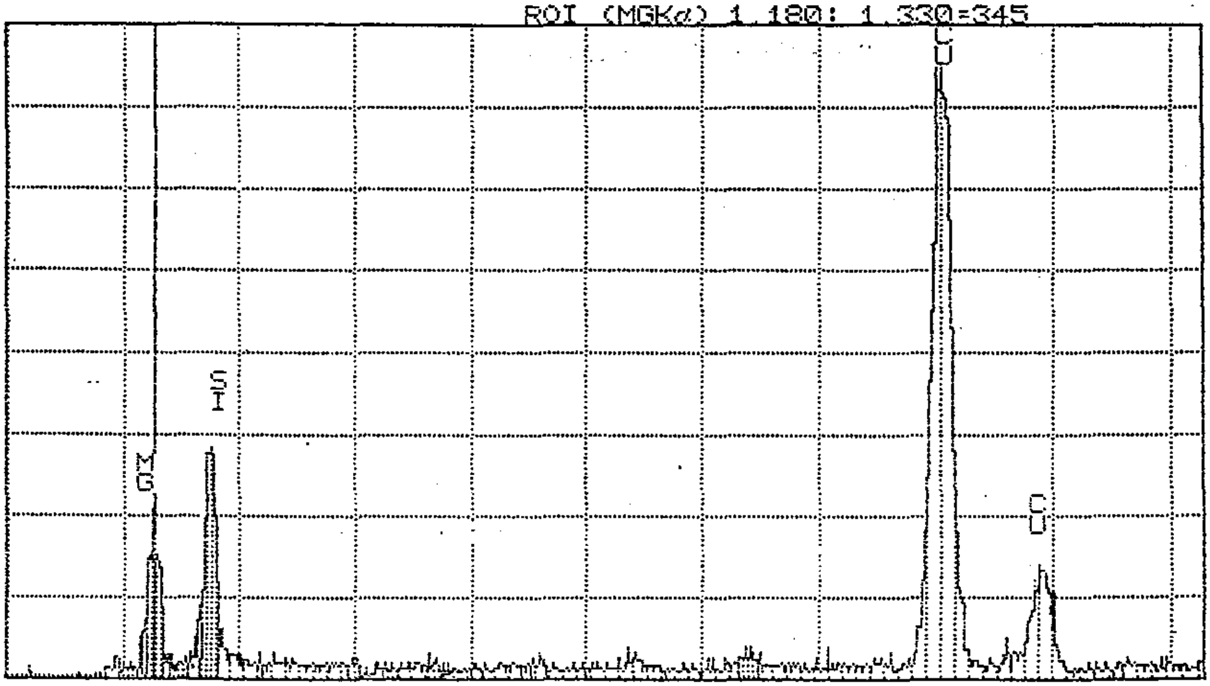

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85 M13824-1 , CHRYSOTILE

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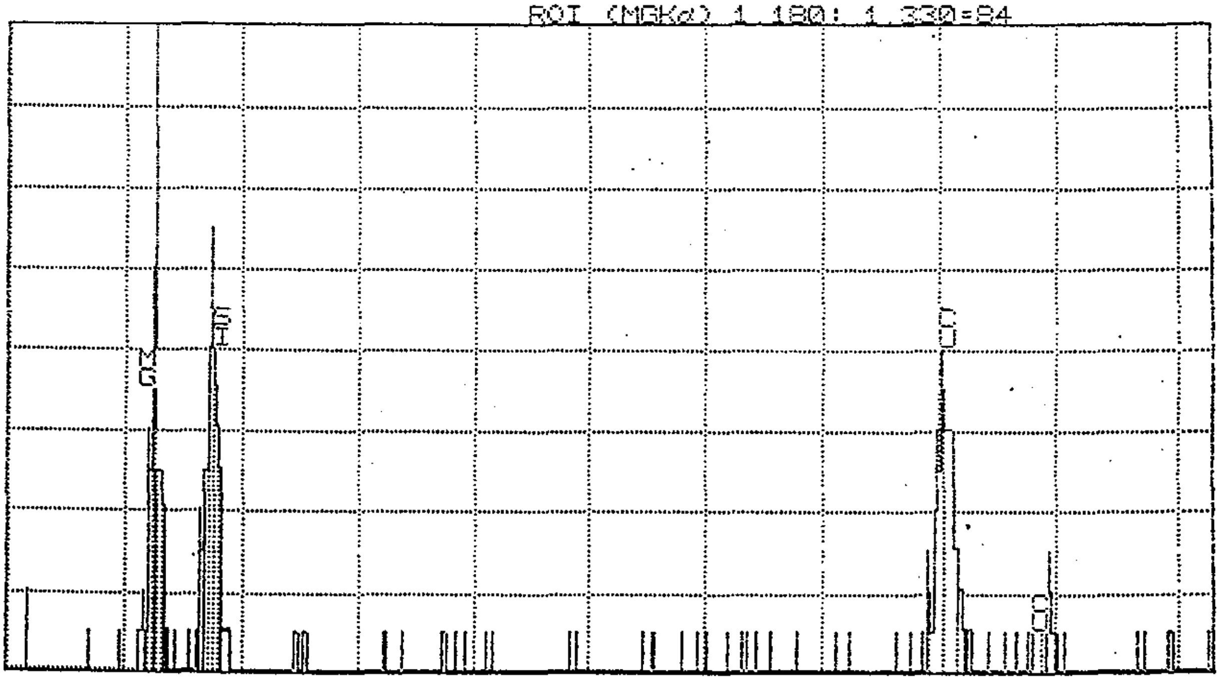

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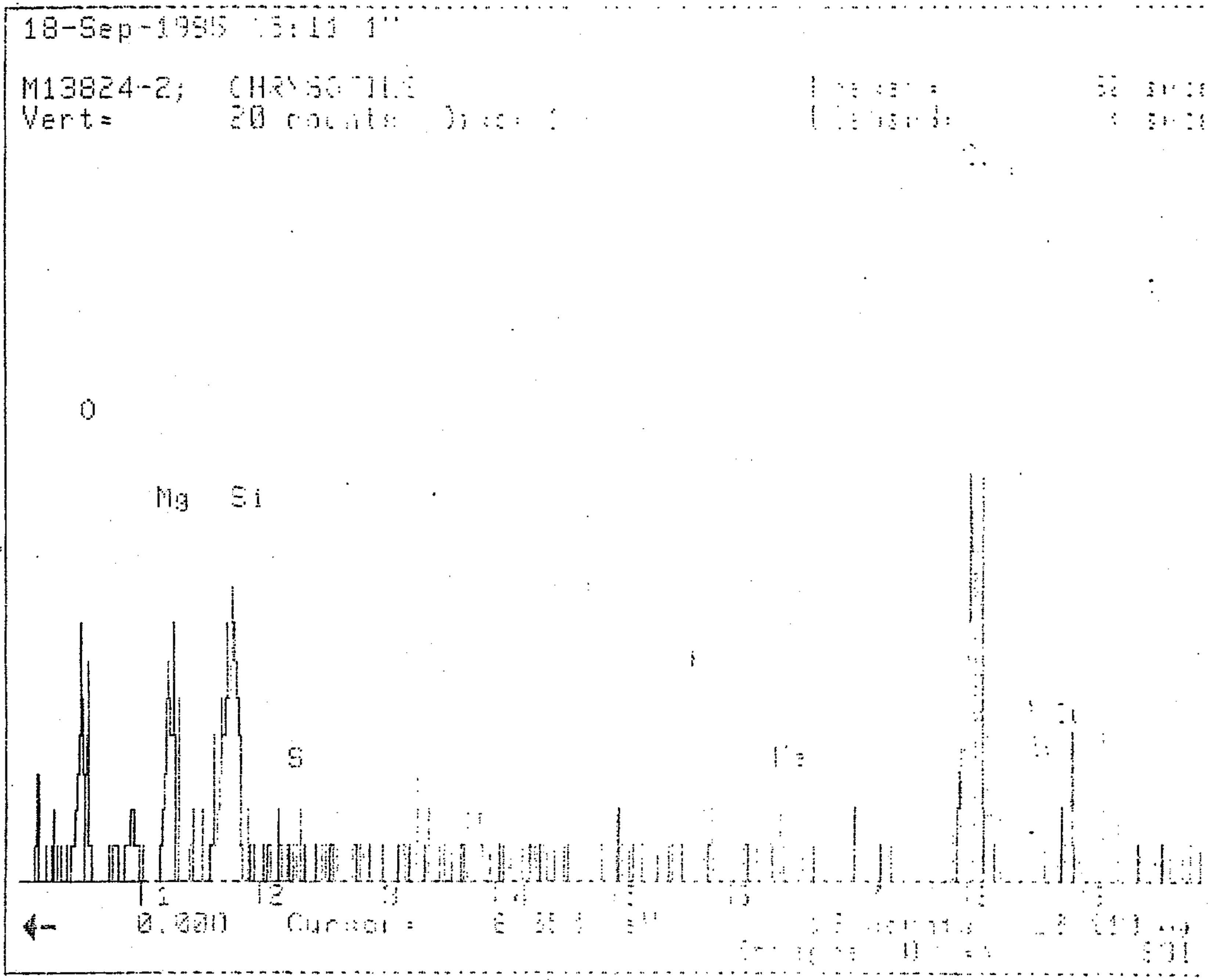
9 M13824-1 , CHRYSOTILE


18-Sep-1995
M13824-2; CHRYSOTILE
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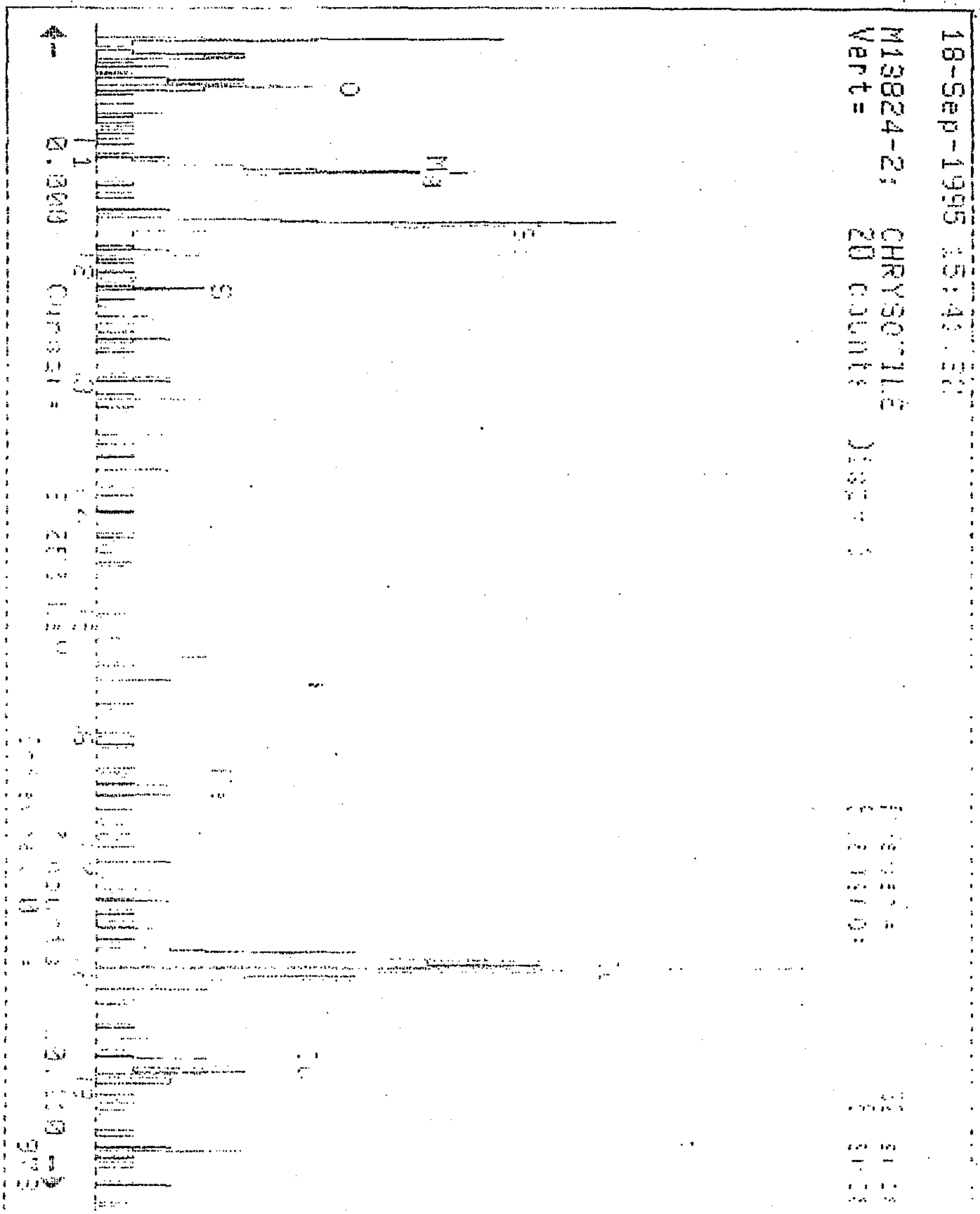
O
Mg
Si
S
Fe
1
2
3
0.000
Cursor =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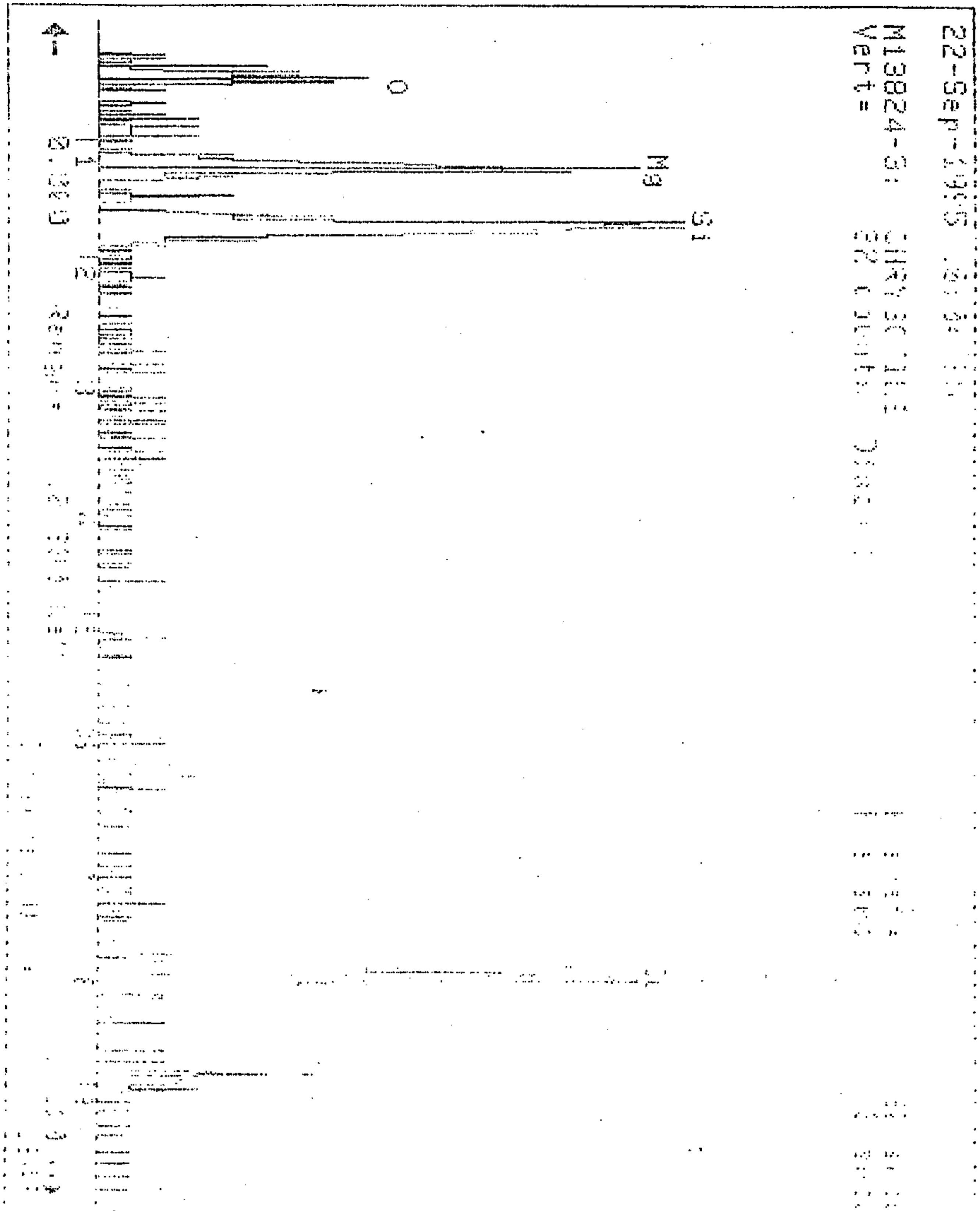
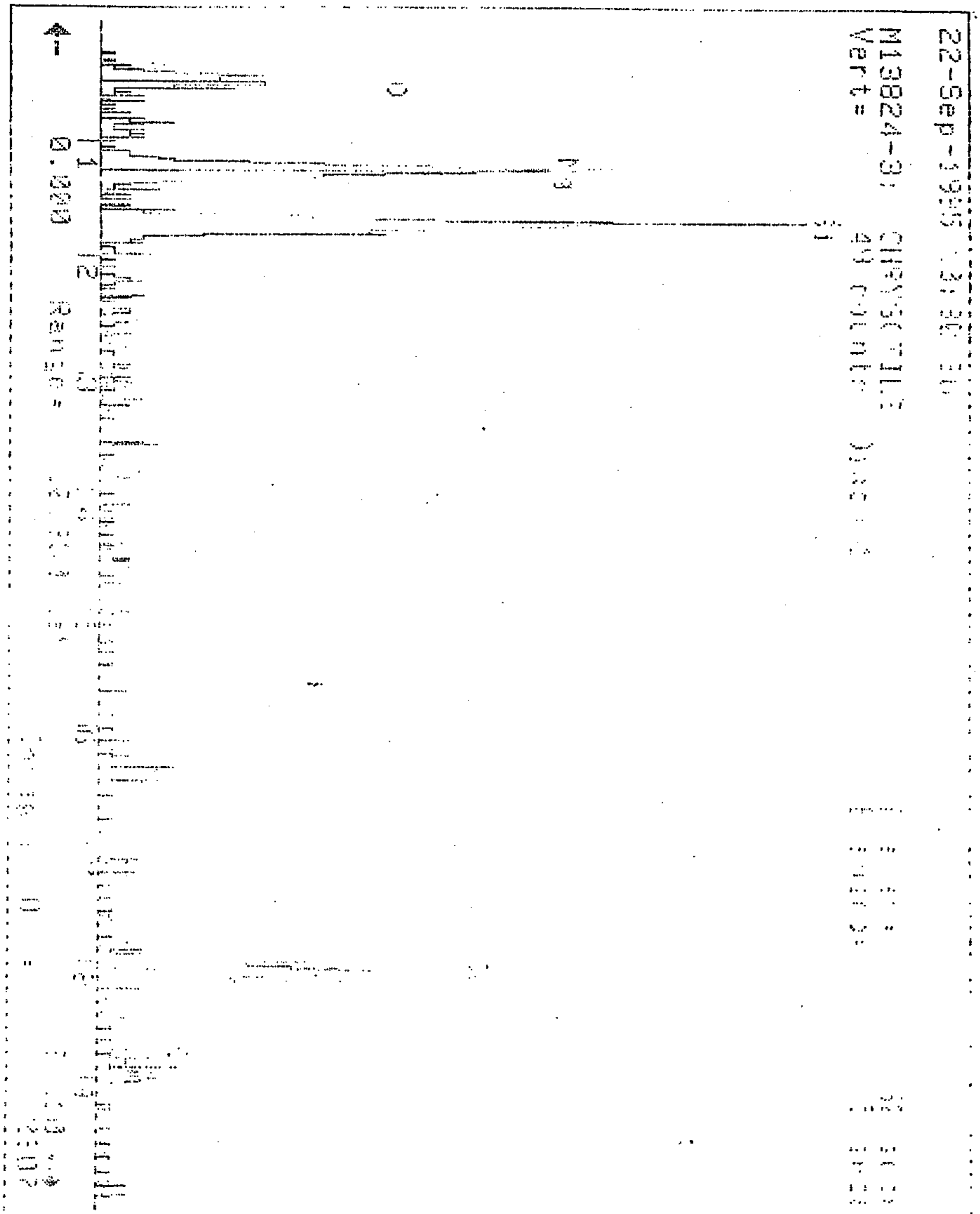
Mg
Si





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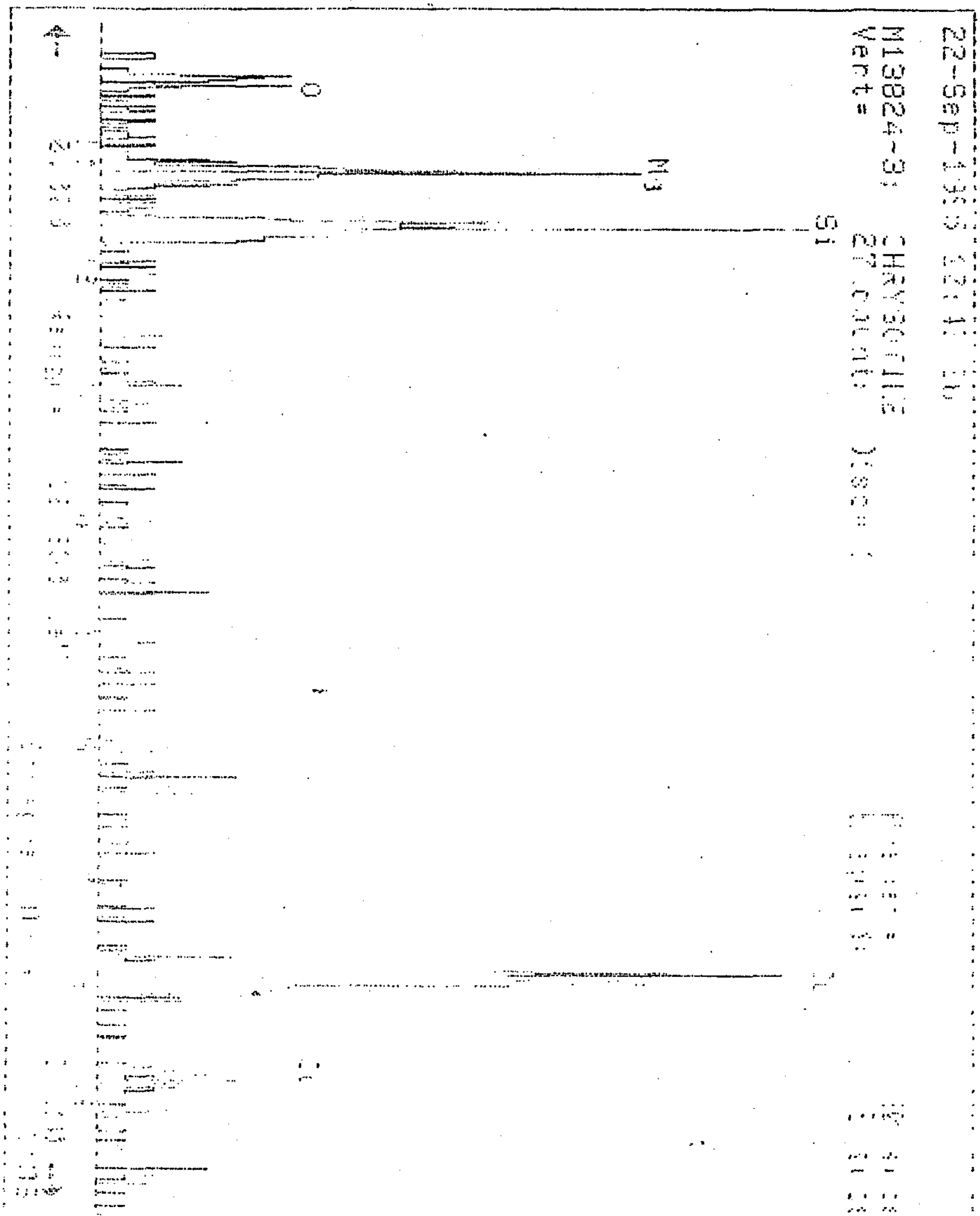
22-Sep-
M13824-3
Vert =
O
Si

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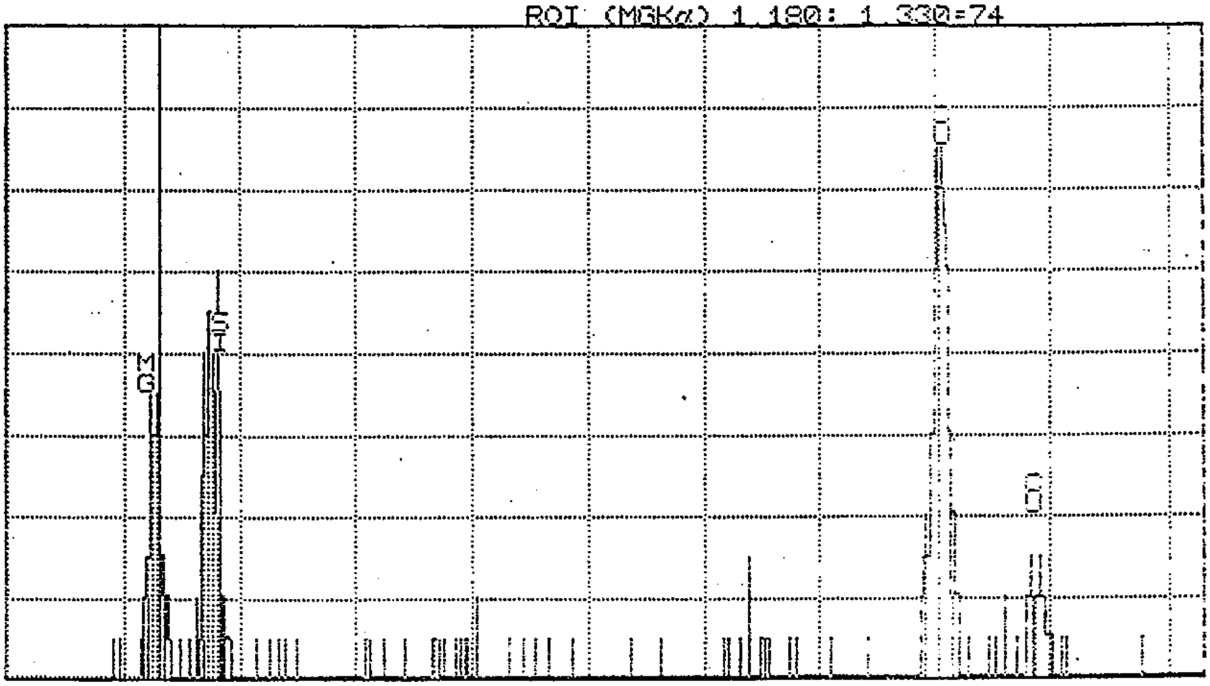
ROI (MGKα) 1.180: 1.330=74



0.000 VFS = 16 10.240
16 M13824-4 , CHRYSOTILE

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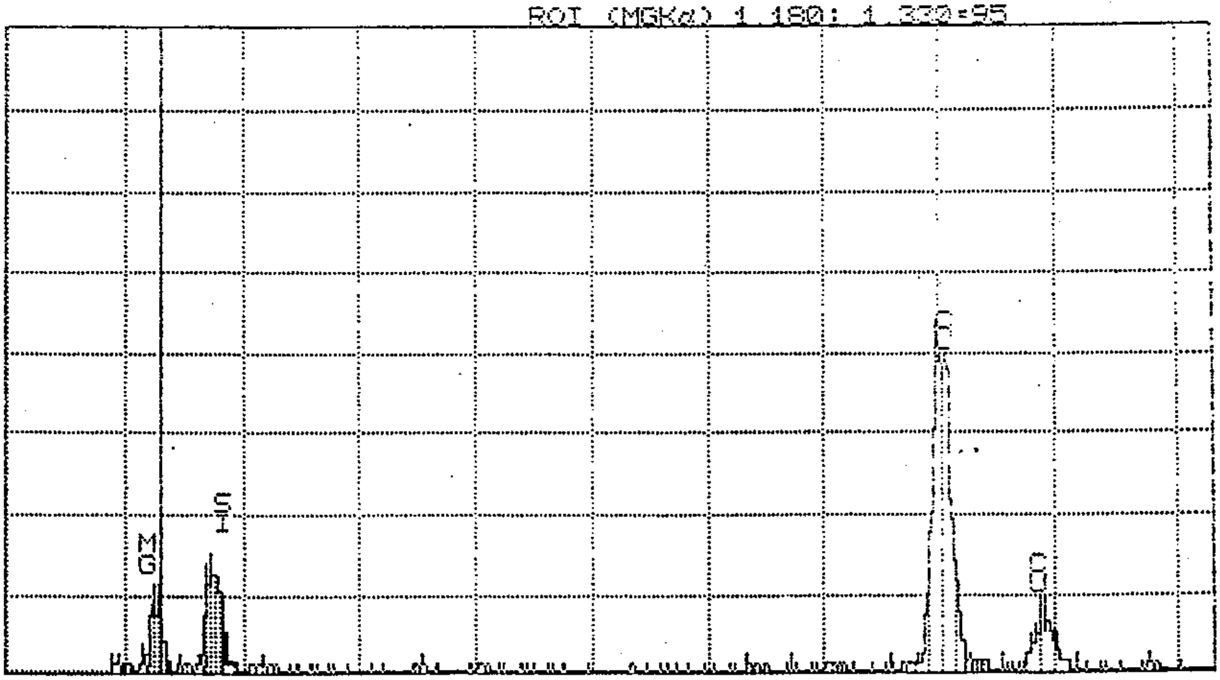
ROI (MGKα) 1.180: 1.330=95



0.000 VFS = 64 10.240
4 M13824-4 , CHRYSOTILE

PRUDENTIAL BUILDINGS: REPORT OF
WILLIAM M. EWING, CIH

Prepared by:

William M. Ewing, CIH
Technical Director
Compass Environmental, Inc.
Robinson Road, Suite B
Marietta, Georgia 30068

July 30, 1996

PRUDENTIAL BUILDINGS: REPORT OF
WILLIAM M. EWING, CIH

TABLE OF CONTENTS

PRUDENTIAL BUILDINGS: REPORT OF WILLIAM M. EWING, CIH

I. INTRODUCTION AND BACKGROUND

William M. Ewing, CIH of Compass Environmental Inc., 2231 Robinson Road, Suite B, Marietta, Georgia 30068, was requested to evaluate selected buildings previously or currently owned by Prudential. Mr. Ewing is an expert on asbestos in buildings issues. Mr. Ewing is qualified as an expert in this area as a result of his education and experience in the field of asbestos identification, evaluation and control.

Mr. Ewing received a Bachelor of Sciences in Biology from Washington and Lee University. In 1978, Mr. Ewing worked at Clayton Environmental Consultants, Inc. as an industrial hygienist. In 1981, he joined the Georgia Tech Research Institute and started their industrial hygiene laboratory, instituted the hazardous waste program for small business in Georgia, was director of the EPA-sponsored Asbestos Information Center, and served as an industrial hygienist under the 7 (c) (1) program, sponsored by OSHA. In 1983, Mr. Ewing became board certified in the comprehensive practice of industrial hygiene. He was re-certified in 1989 and 1995 in accordance with the American Board of Industrial Hygiene requirements. In 1995 he was nominated by his peers and appeared as an American Industrial Hygiene Association Fellow Member. In 1987, he left the Georgia Tech Research Institute to take the position of Executive Vice President at The Environmental Management Group, Inc. In 1990, Diagnostic Engineering, Inc. acquired

The Environmental Management Group, Inc. and employed Mr. Ewing as Regional Technical Director until 1993 when he formed the consulting firm, Compass Environmental, Inc., where he is currently the Technical Director.

During his career, Mr. Ewing has conducted numerous industrial hygiene, asbestos management and environmental studies. He has authored several publications and served on many committees, including governmental and industrial committees, to study the following: identifying asbestos in buildings, disposal of asbestos-containing materials, and removal of asbestos-containing materials in buildings. Mr. Ewing has provided asbestos-related consulting services to property managers and building owners throughout the United States and Canada. He has conducted over 1,000 asbestos surveys for asbestos-containing material (ACM). He has developed asbestos management and control programs in commercial and government facilities; including commercial office buildings, schools, hospitals, ships, industrial plants and government buildings. In addition, Mr. Ewing has frequently directed or lectured in training courses sponsored by universities, government agencies and private interests on topics including industrial hygiene, respiratory protection, and asbestos identification, evaluation, and control.

As a result of Mr. Ewing's work experience and asbestos training, he is qualified to offer opinions related to asbestos in buildings including the following: the condition of the in-place asbestos-containing materials; air, dust, and bulk sampling techniques; regulations and guidance documents applicable to asbestos in buildings; the reasonableness of the

precautions taken by building owners and managers for maintaining in-place asbestos-containing materials; the contamination in a building resulting from the in-place asbestos-containing materials; options available to building owners and managers when dealing with asbestos; the necessity to remove the in-place asbestos-containing materials during a renovation; and the ultimate need to remove the asbestos-containing materials upon demolition of the building. Mr. Ewing's expert qualifications and training are set forth more fully in his Curriculum Vitae in Appendix A.

Mr. Ewing has testified as an expert on asbestos-in-building issues on several occasions in both federal and state court. Included in Appendix B is a list of Mr. Ewing's asbestos expert deposition and trial testimony over the last five years. Compass Environmental, Inc. has and will be compensated for Mr. Ewing's time at a rate of $145/hour. Compensation for Mr. Dawson's time is at a rate of $95/hour.

The purpose of the Prudential buildings evaluation was to review actions taken to date by the building owner, conduct inspections of remaining fireproofing in the buildings, determine the current condition of the remaining asbestos-containing fireproofing, conduct sampling as appropriate, and opine on the reasonableness of the asbestos program implemented by the building owner.

This report summarizes these findings and includes a description of methods employed, a discussion of the findings, and conclusions drawn based on these findings. Included as

Appendices to this report are photographs and laboratory results of sampling conducted. In addition to the references cited herein, Mr. Ewing may rely on the opinions, data and publications contained in plaintiffs' other expert reports.

II. PROCEDURES AND METHODS

The buildings included for consideration are listed in Table 1. For all buildings, documents related to asbestos-containing materials were reviewed. Site visits were made to all buildings except the Short Hills Office Complex in Short Hills, New Jersey. The Short Hills Office Complex in Short Hills was completely abated prior to demolition in 1984. [1-4]

Table I. Selected Prudential Buildings

Building Name	Location
Embarcadero I	San Francisco, CA
Embarcadero II	San Francisco, CA
Chatham Center/Hyatt	Pittsburgh, PA
130 John Street	New York, NY
Hunt Valley Marriott	Hunt Valley, MD
5 Penn Center	Philadelphia, PA
Prudential Plaza	Newark, NJ
Brookhollow I	Houston, TX

Short Hills Office Complex	Short Hills, NJ
Renaissance Tower	Dallas, TX
Northland Towers	Southfield, MI
First Florida Tower	Tampa, FL
Northwest Financial Center	Bloomington, MN
1100 Milam	Houston, TX
Prudential Plaza	Denver, CO
Southdale Office Complex	Edina, MN
Century Center I & IV	Atlanta, GA
Twin Towers	Atlanta, GA

For each building various asbestos-related documents were reviewed, often including the asbestos survey, operations and maintenance program and floor plans. These documents were reviewed to gain an understanding of the building lay-out, use, occupancy, and the types of asbestos-containing materials known to be present, and their locations. Arrangements for the building visits were made with each building representative. This was often the building manager or building maintenance director. Assistance was usually provided by building maintenance staff, local asbestos consultants, and/or local asbestos abatement contractors, as necessary.

The results of asbestos surface dust sampling for each building visited were reviewed. These samples were collected by Law Associates, Inc. and analyzed by Materials

Analytical Services, Inc. (MAS). All of these samples were collected in 1988 - 1995. The results of bulk sample analyses were also reviewed with William E. Longo, Ph.D. of MAS. For these buildings the focus was the spray-applied asbestos-containing fireproofing.

At each building a visual inspection of the remaining fireproofing was conducted to determine its current condition and accessibility. The assessment techniques employed were as described in the Asbestos Hazard Emergency Response Act (AHERA) regulations promulgated by the US Environmental Protection Agency (EPA).[5-7] The Asbestos School Hazard Abatement Reauthorization Act (ASHARA) extended certain provisions of the AHERA regulation to public and commercial buildings.[8] One significant provision was the requirement that only accredited inspectors perform building inspections.[9] The assessment procedures used by accredited inspectors is that prescribed by AHERA.

The AHERA assessment procedures place each friable asbestos-containing material into an assessment category based on its degree of damage. For a surfacing material such as friable fireproofing the available categories include:

1. Significantly damaged friable surfacing ACBM (asbestos-containing building material) - a material exhibiting greater than 10% damage evenly distributed or 25% damage in a localized area.

2. Damaged friable surfacing ACBM - a material exhibiting greater than 1 - 2% damage and less than 10% damage evenly distributed or 1 - 2% damage and less than 25% damage in a localized area.

3. Friable surfacing ACBM with a potential for significant damage - a material that is not damaged or significantly damaged but has the potential for damage that would be both extensive and severe.

4. Friable surfacing ACBM with a potential for damage - a material that is not damaged or significantly damaged but has the potential for damage to occur.

5. Other friable ACBM - a surfacing material that does not fall into one of the four previous categories.

Damage of a surfacing material is evidenced by the presence of physical damage such as gouges, blistering, and vandalism; water damage indicated by stains, flaking, or delamination; and damage due to deterioration or vibration. Damage due to deterioration or vibration is visually assessed by the presence of ACBM debris (having the same color and texture) on surfaces beneath the ACBM.

In addition to the visual assessment, surface dust sampling was also conducted in six buildings. Small particles, generally less than 1 millimeter (mm) in diameter, cannot

usually be identified as ACBM based on color and texture. Dust sampling with analysis by transmission electron microscopy (TEM) allows for a quantitative estimate of asbestos structures on surfaces. Since dust sampling had been conducted previously in most of these buildings, the primary purpose was to augment the previous sampling and conduct side-by-side measurements to compare results using the 1988 methodology with the 1995 ASTM method D 5755-95.

In each of five Prudential buildings, three locations were randomly selected. Each location was a horizontal non-porous surface beneath asbestos-containing fireproofing. All locations had a visually discernible layer of dust. No particles greater than 1 mm in diameter were on the surfaces sampled. At each location, two samples were collected side-by-side. One of these samples was collected using the 1988 methodology and one collected as described in the current ASTM method.

The sampling conducted in 1988 - 1989 by Law Associates used a 37 mm diameter cassette attached to a pump calibrated at 2 liters per minute (l/min). These samples were collected from a measured surface area, usually one square foot. The 1988 - 1989 sampling used a 0.8 µm pore size mixed cellulose ester (MCE) filter and collected the sample open face.

The ASTM standard method in 1995 allows for a 25 mm cassette, any pore size equal to or less than 0.8 µm, an MCE filter, and a standard collection area of 100 cm^2 (although

smaller or larger areas are allowed). The significant difference is the addition of a sample collection nozzle providing a standard flowrate at the surface of approximately 100 centimeters per second (cm/sec). This value is considerably higher than the 6.4 cm/sec velocity when an open face 37 mm cassette is used (33 mm effective area). A copy of the ASTM method is included at Appendix C.

All dust samples were submitted to MAS for analyses. It was requested the laboratory follow the same procedures followed in 1988 for the 37 mm cassettes and the ASTM standard method for the 25 mm cassettes. Eight field blank (control) samples were also submitted as a check for systematic contamination in the field or laboratory. Results were reported as asbestos structures per square centimeter (s/cm^2) and asbestos structures per square foot (s/ft^2).

Following the building visits, additional documents related to the asbestos in the Prudential buildings were reviewed. These consisted of additional building surveys, asbestos management procedures, abatement records, air monitoring reports, laboratory reports, and other miscellaneous records. In addition, documents and deposition transcripts of defendants' representatives were reviewed. Principal documents relied upon appear in the reference list at the conclusion of this report.

III. PRESENTATION AND DISCUSSION OF FINDINGS

Findings are discussed below by building followed by a general discussion of topics that apply to multiple buildings.

P. FIRST FLORIDA TOWER, TAMPA, FL

The First Florida Tower is located at 111 Madison Street in downtown Tampa, FL. It is a 38-floor office building with multiple tenants. It has a ducted supply air ventilation system with an open above ceiling return air system. Originally, asbestos-containing fireproofing was applied to the structural steel of the basement, first-floor and floors 7 - 36. Floors 2 - 6 are a parking garage and were reported never to have had fireproofing.(66,67)

The fireproofing is a high density spray-applied product reported to be Monokote MK-3.(38) William M. Ewing, CIH and Tod A. Dawson of Compass inspected the building on April 15, 1996. The original fireproofing was inspected on the basement, 1st, 9th, 35th and 36th floors. The fireproofing was reported removed from all other floors.(68)

The fireproofing was consistently rated as damaged friable surfacing ACBM, with some areas rated as significantly damaged (35th floor kitchen) and some areas rated as friable surfacing ACBM with a potential for damage (basement vault). The types of damage included physical damage, water damage and deterioration.

Physical damage is illustrated in photographs 15 10:43, 15 10:47, 15 10:54 and 15 12:41. Water damage was evidenced by instances of delamination of the fireproofing as shown in photographs 15 12:36, 15 12:38 and 15 12:39. At many locations inspected, a rust layer has developed at the interface between the fireproofing and the steel beam. Visually, a

yellow discoloration is observed where the fireproofing application is thin (5 mm or less). This can be seen in photographs 15 10:38, 15 10:43, and 15 10:49. This rust layer results in loss of adhesion between the fireproofing and structural steel with subsequent delamination. In most instances at the First Florida Tower there was not evidence of water intrusion being responsible for this layer of rust. This has been observed previously in other buildings situated in humid environments.[69]

Fireproofing dust and debris were observed on surfaces below the in-place fireproofing. Fireproofing debris having the same color and texture as the in-place material is visible in photographs 15 12:26, 15 12:35 and 15 13:14. Surface dust sampling was conducted by Law Engineering in 1988 and 1995.[70, 71] These results, summarized in Appendix D demonstrate a high level of asbestos surface contamination throughout the return air plenum spaces in the building.

A review of asbestos-related building documents resulted in 17 personal air samples collected during maintenance or renovation activities.[72, 73] The exposure concentrations were in a range of 0.01 to 1.36 f/cc. These results are summarized in Table 10 of Appendix F. The building records indicate that a considerable number of additional personal samples were collected. However, since renovations and maintenance activities are normally conducted by outside contractors, these results were not found in the building records.

S. ROUTES OF ASBESTOS EXPOSURE IN BUILDINGS

Asbestos exposure from friable in-place materials occurs in several ways. First, asbestos fibers are slowly released through deterioration over time. In the EPA guidance document, Controlling Asbestos-Containing Materials in Buildings, they stated, "Areas covered by ACM tend to be large. If the material is friable, fibers are slowly released as the material ages."[(83)] This concept was also recognized in the guidance document issued by the British Department of the Environment which stated, "As it ages, sprayed asbestos may release more fibers and asbestos dust may accumulate in adjacent areas."[(84)]

The second common method of fiber release from in-place friable ACM is through impact or direct contact. This form of release occurs when the material is struck, scraped or brushed such as during maintenance or renovation activities. The magnitude of the release is proportional to the intensity of the activity causing the disturbance.

Once asbestos fibers are liberated from a material such as fireproofing, the fibers will slowly settle onto surfaces. If not removed, the surfaces will accumulate increasing concentrations of asbestos dust. This dust may then become resuspended into the air. Custodial and maintenance procedures such as sweeping floors with asbestos dust or changing ceiling tiles with settled dust are examples of activities which re-suspend dust into the air.

These concepts of fiber release and re-suspension are widely recognized and have been demonstrated repeatedly in observational and experimental studies.[85-90]

T. EPISODIC EXPOSURE STUDIES

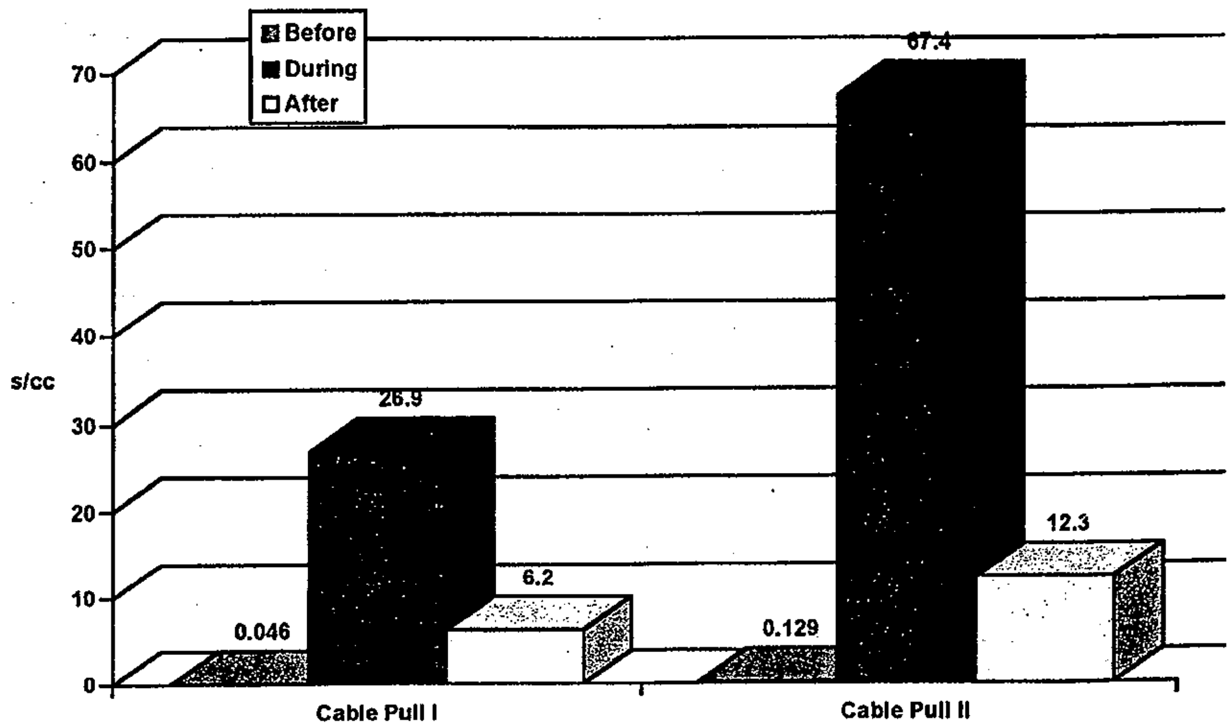
Industrial hygienists often refer to asbestos exposures in buildings as being either prevalent level or episodic. Prevalent level exposure refers to the continuous concentration of asbestos in the air. Prevalent level exposures are usually low in buildings with spray-applied fireproofing.[91-92] Area air sampling has traditionally been used to measure the prevalent level.

Episodic exposures are often associated with a specific activity which disturbs the in-place fireproofing or settled dust containing asbestos. Such exposures represent a rapid rise in the airborne asbestos concentration followed by a gradual decline.[91] Episodic exposures generally are limited to portions of the building where the activity occurs. However, ventilation patterns may distribute airborne asbestos to adjoining areas or even remote locations. Periodic air sampling in a building, such as once a year or every 6 months is unlikely to detect episodic exposures. For this reason the EPA recommends against air sampling alone for assessing the condition of asbestos-containing materials.[83,93]

In a series of studies, episodic exposures were evaluated during routine maintenance and custodial activities in buildings with surfacing ACM. Five of these studies were conducted

in buildings with spray-applied fireproofing which was the same or substantially similar to the fireproofing in the Prudential Buildings. The results of these studies have been published in peer-reviewed journals and are summarized in Figures 1 - 5.[87, 89, 90]

In each of the five studies a particular maintenance, renovation or custodial activity was chosen. Area air sampling was conducted before, during, and after each activity. Personal air samples were also collected on the individuals performing the activities. All samples were analyzed by transmission electron microscopy (TEM) and the personal samples were analyzed by TEM and phase-contrast microscopy (PCM). In each study it was found that the asbestos exposures during the activity increased significantly when compared to concentrations in the air before the activities began. In each instance, the source of the asbestos exposure was the fireproofing, or the dust and debris from the fireproofing.



Asbestos Concentrations During Cable Installation

DESCRIPTIVE STATISTICS OF ASBESTOS CONCENTRATIONS

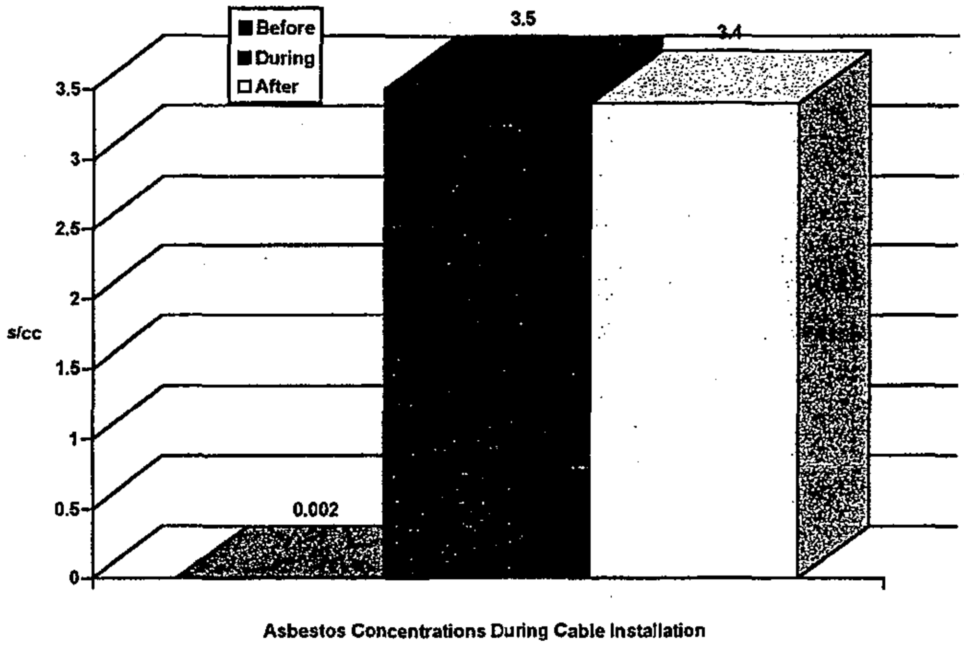
Cable Pull I

Phase	Arithmetic Mean (s/cm^3)	Arithmetic Std. Dev. (s/cm^3)	Geometric Mean	Number of Observations
Before Inst.	0.052	0.030	0.046	5
During Inst.	28.9	12.6	26.9	5
During (Pers.)	10.5	11.6	7.1	3
After Inst.	8.4	7.0	6.2	6

Cable Pull II

Phase	Arithmetic Mean (s/cm^3)	Arithmetic Std. Dev. (s/cm^3)	Geometric Mean	Number of Observations
Before Inst.	0.158	0.094	0.129	5
During Inst.	100.2	91.9	67.4	4
During (Pers.)	124.8	85.6	102.7	3
After Inst.	17.0	13.5	12.3	4

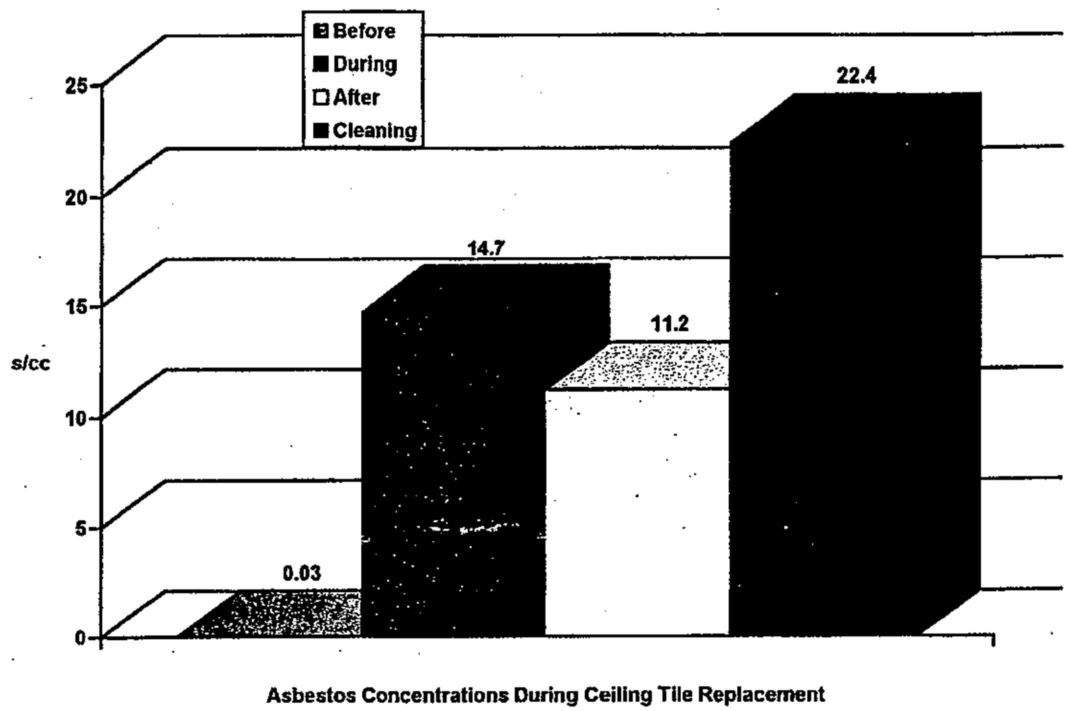
Figure 1. Episodic Exposure Results Before, During and After Installation of Cables in the Vicinity of High Density Fireproofing



DESCRIPTIVE STATISTICS OF ASBESTOS CONCENTRATIONS

Phase	Arithmetic Mean (s/cm^3)	Arithmetic Std. Dev. (s/cm^3)	Geometric Mean	Number of Observations
Before	0.006	0.014	0.002	5
During (Area)	3.6	0.84	3.5	5
During (Pers.)	26	7.5	26	2
After	3.8	1.9	3.4	5

Figure 2. Episodic Exposure Results Before, During and After Installation of Cables *in the Vicinity of Low Density Fireproofing*

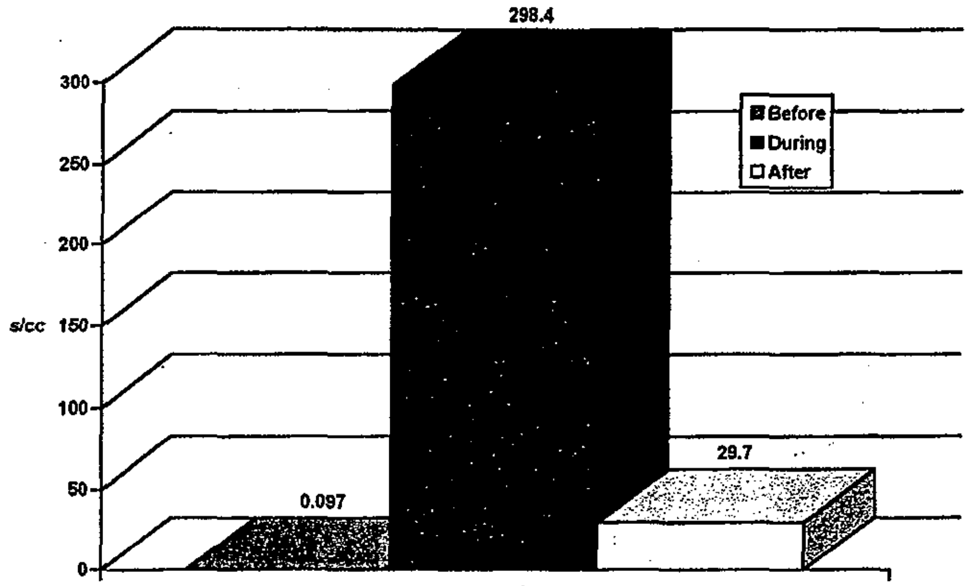


DESCRIPTIVE STATISTICS OF ASBESTOS CONCENTRATIONS

Phase	Arithmetic Mean (s/cm^3)	Range (s/cm^3)	Geometric Mean (s/cm^3)	Number of Observations
Before	0.05	ND - 0.08	0.03	5
During	15.3	10 - 20	14.7	5
During (Pers.)	23.0	22 - 24	23.0	2
After	11.4	9 -14	11.2	5
Cleaning	22.4	20 - 24	22.4	5

ND = No Asbestos Structures Detected

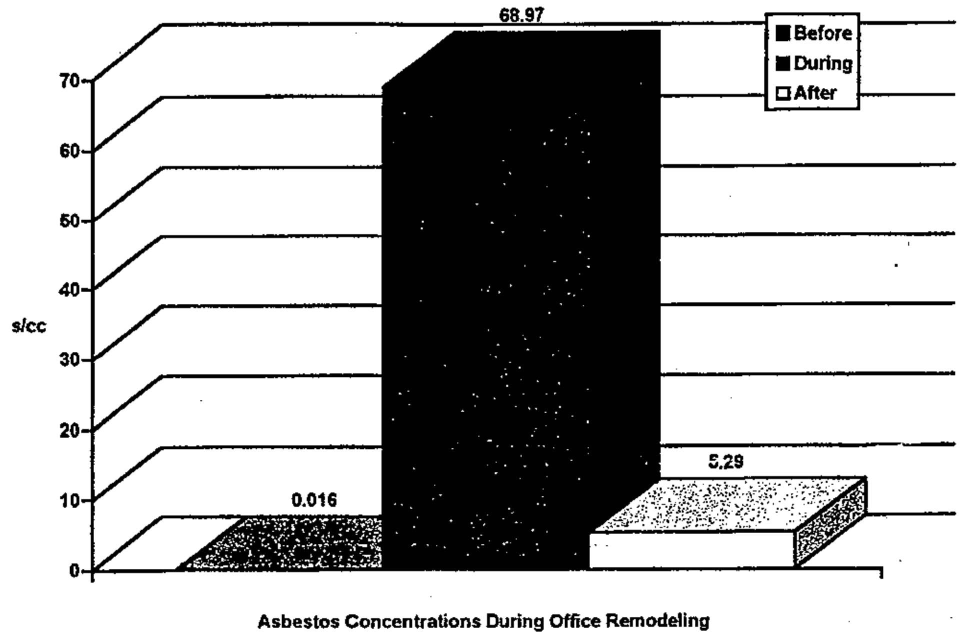
Figure 3. **Episodic Exposure Results Before, During, and After Replacement of Ceiling Tiles Below Fireproofing**



DESCRIPTIVE STATISTICS OF ASBESTOS CONCENTRATIONS

Phase	Arithmetic Mean (s/cm^3)	Arithmetic Std. Dev. (s/cm^3)	Geometric Mean	Number of Observations
Before - Inside	0.264	0.221	0.097	5
During - Inside	329.9	173.0	298.4	5
During - Inside (Personal)	343.8	360.6	237.1	3
After - Inside	31.8	12.3	29.7	5

Figure 4. Episodic Exposure Results Before, During and After Cleaning a Storage *Room in a Building with Fireproofing*



DESCRIPTIVE STATISTICS OF ASBESTOS CONCENTRATIONS

Phase	Arithmetic Mean (s/cm^3)	Arithmetic Std. Dev. (s/cm^3)	Geometric Mean	Number of Observations
Before	0.045	0.048	0.016	5
During (Area)	73.32	27.08	68.97	6
During (Pers.)	150.79	164.68	71.60	4
After	5.81	2.39	5.29	4

Figure 5. Episodic Exposure Results Before, During and After Remodeling One Office in a Building with Fireproofing

U. MAINTENANCE AND RENOVATION EXPOSURE DATA

A review was conducted of the asbestos-related files stored at the offices of Riker, Danzig, Scherer, Hyland & Perretti in Morristown, NJ. The purpose of the review was to extract air sampling data collected during maintenance, custodial, and renovation activities in the Prudential buildings discussed in this report. No effort was made to locate data for other Prudential buildings. In excess of 375 file boxes were reviewed by William M. Ewing, CIH and Tod A. Dawson.

No custodial worker's exposure data was located for these buildings. This is not unusual since custodians have only rarely been monitored for asbestos exposure.[91] Maintenance and renovation activity exposure sampling was located for eleven buildings. These included Embarcadero Center I, Embarcadero Center II, One Chatham Center, 5 Penn Center, Renaissance Center, Prudential Plaza - Denver, Southdale Office Complex, Twin Towers, Century Center, First Florida Tower, and the 1100 Milam Building. Only the personal samples were selected from the data available for ten of these buildings. Since the data available from the Chatham Center included only two personal samples which were too heavily loaded to analyze, the area samples from this building were included. All samples included have been summarized in Tables 1 - 11 of Appendix F.

All the samples included were stated to be collected and analyzed by either National Institute for Safety and Health (NIOSH) method 7400, or its predecessor NIOSH method

P&CAM 239.[94, 95] Both methods collect airborne particles by passing air through a filter. The filter is then analyzed by phase contrast optical microscopy for fibers. Any fibers greater than 5 micrometers long, approximately 0.25 micrometers wide, and having an aspect ratio of 3:1 are included in the count. Limitations of the method include the inability to identify asbestos fibers or "see" (resolve) thin fibers/bundles of asbestos. It was and continues to be widely used since it is the "OSHA method," is inexpensive, provides quick results, and is widely available.

The work activities monitored and summarized in Appendix F include maintenance and renovation activities performed in the vicinity of asbestos-containing fireproofing. Such activities include replacing ceiling tiles, installing cables, electrical conduit and copper pipe, removing light fixtures, shooting pipe hangers, installing ceiling tile grid, removing duct work, removing walls, and clean-up activities. Efforts were made during the selection of samples for inclusion not to include samples where removal of fireproofing was occurring. The sources for the data included are listed at the end of each table and given in the Reference section of this report.[41, 42, 43, 52, 53, 59, 64, 65, 72, 73, 79, 82, 96-105]

A total of 1097 samples (1066 personal samples, 31 area samples) are included in the data set. Of these, 22 samples are reported as overloaded and 3 samples were reported voided.

Of the 1066 personal samples, 505 (47%) were greater than or equal to 0.1 f/cc and 82 (8%) were greater than 1 f/cc. These results are depicted in Figure 6. These results are

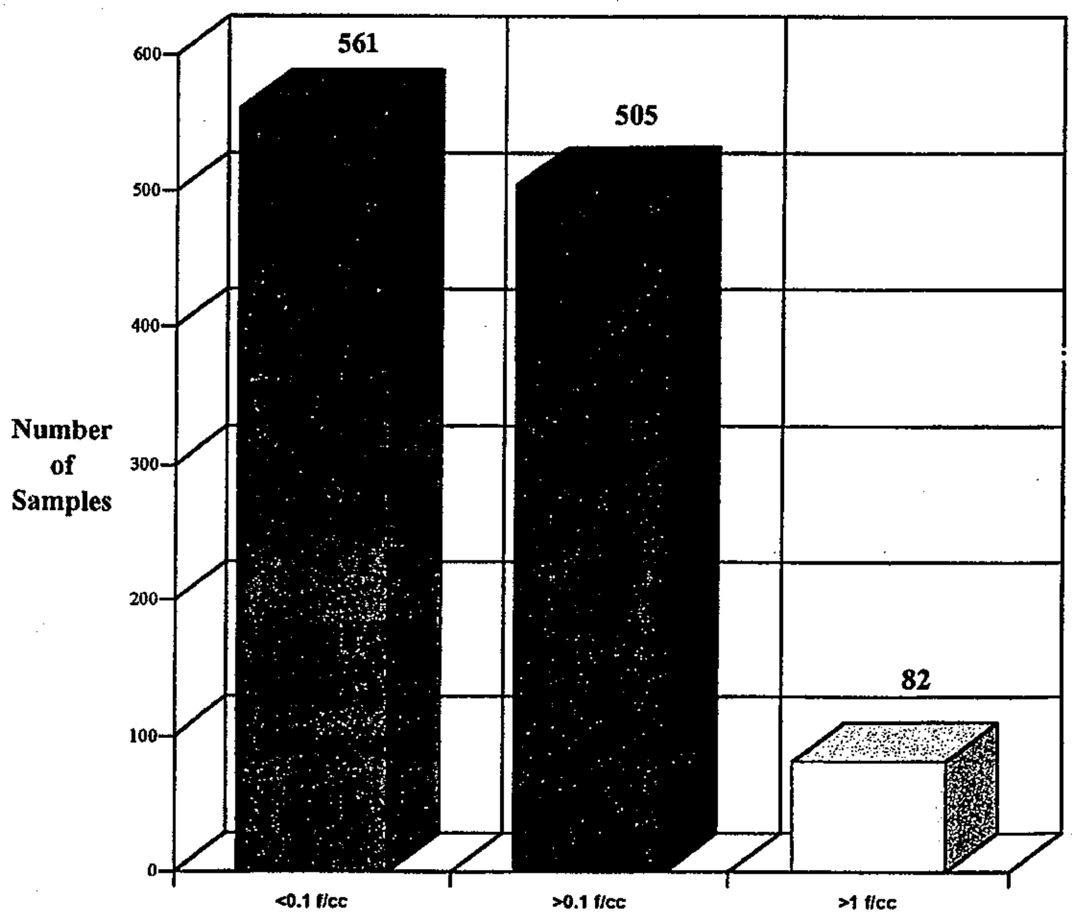


Figure 6. Distribution of Fiber Concentrations Measured on Persons Performing Maintenance and Renovation Activities in Prudential Buildings (1066 samples)

consistent with results reported in the published literature and further demonstrate that maintenance and renovation activities in buildings with spray-applied friable fireproofing routinely cause elevated airborne exposures.

V. SURFACE DUST EVALUATION

The results of surface dust samples collected and analyzed by ASTM method D 5755-95 for Embarcadero Center I, II, 5 Penn Center, Renaissance Tower, Northland Towers, and Prudential Plaza (Newark) were discussed in conjunction with the individual building site visits in this report. At 15 dust sampling locations a second sample was also collected using the method previously employed by Law Engineering, Inc. in these buildings. The sampling and analytical techniques are described in the Procedures and Methods section of this report. All results are tabulated in Appendix D and the laboratory reports included as Appendix E.

The results were evaluated and a correlation performed on the 15 pairs of sample results. For all 15 pairs a positive correlation coefficient of 0.62 was obtained with a slope of 5.165 and an intercept of 2.73×10^6. Further analysis found the correlation coefficient for three buildings (EC I, EC II, and Renaissance) to be 0.80 with a slope of 4.875 and an intercept of 3.7×10^5. When the correlation coefficient is calculated for the sample pairs collected in the remaining two buildings (5 Penn Center and Prudential Plaza - Newark) the results is 0.98 with a slope of 18.27 and an intercept of -1.16×10^5. The reason for

the correlation of the subsets to be better than the correlation of the entire set is the different slopes of the regression lines.

Basically, it was determined that the ASTM method D 5755-95 provides results 17 and 22 times greater than the earlier Law Engineering method in the 5 Penn Center and Prudential Newark buildings, respectively. In the Embarcadero Center Buildings (2) and the Renaissance Tower the increase using the ASTM method D 5755-95 was, on average, 4 - 7.3 times the Law Engineering method. In no sample was the ASTM method result lower than the corresponding side-by-side sample collected according to the Law Engineering procedure.

The one significant difference between the two methods is the sample collection. The ASTM method employs a sample nozzle with a known diameter of 0.63 cm and a flowrate of 2.0 l/min. This provides a face velocity at the point of dust collection of 106 cm/sec. The Law Engineering method used an open face 37 mm cassette with an effective collection area (diameter) of 33 mm. Also operating at 2.0 l/min, this provides a face velocity at the point of dust collection of 6.4 cm/sec. Accordingly, the ASTM method provides a face velocity over 16 times the face velocity of the Law Engineering method.

A total of 1053 asbestos structures were identified, characterized and sized in the 30 samples. No asbestos structures were detected in the 8 blank (control) samples. Each asbestos structure was characterized as either a bundle, matrix, cluster, or fiber. Table 2.

depicts the distribution of structure types for all samples. It is apparent that the two methods produce rather similar asbestos structure distributions when dusts of similar composition are analyzed. The only reasonable explanation for the ASTM method producing consistently higher results is the improved collection efficiency gained with the higher face velocity at the point of sample collection. Visually this was apparent in the field since considerably more dust remained behind on surfaces sampled with the Law Engineering method than the ASTM method D 5755-95.

On average it was determined that the ASTM method provides results 11 times greater than the Law Engineering protocol. This observation should be considered when evaluating previous dust sampling results collected by Law Engineering in the late 1980's in these Prudential buildings.

Table 2. Asbestos Structure Distribution for 30 side-by-side Surface Dust Samples

Structure Type	Law Method	ASTM Method
Bundles	50 (8.1%)	42 (9.7%)
Clusters	26 (4.2%)	8 (1.8%)
Matrices	267 (43.2%)	170 (39.1%)
Fibers	275 (44.5%)	215 (49.4%)
Totals	618 (100%)	435 (100%)

W. ASBESTOS MANAGEMENT OPTIONS AVAILABLE TO COMMERCIAL BUILDING OWNERS

There are several options available to building owners when developing a policy to manage asbestos-containing materials in buildings. In the short term, implementation of an operations and maintenance (O&M) program is necessary. An O&M program is a set of procedures and practices designed to reduce exposures to in-place asbestos while continuing to operate the building. Such a program requires specific work practices when working in the vicinity of asbestos, training of personnel, use of personal protective equipment, proper disposal techniques, and other elements.[106] Prudential has developed or adopted O&M programs for buildings containing friable asbestos-containing materials.

In the long-term, a permanent solution is developed and implemented. For asbestos-containing fireproofing the options include encapsulation, enclosure, and removal. Of these, only removal is truly a permanent solution. Encapsulation, the spraying of a sealant on the fireproofing, does not prevent future damage or delamination, is costly, and may void the fire rating of the material. Enclosure, an airtight barrier constructed around the fireproofing, is not a feasible option in the vast majority of the Prudential buildings due to the lack of space in which to build the enclosures. Enclosures would also be very costly. The advantages and disadvantages of each option have been reported by the EPA.[83]

From the viewpoint of an industrial hygienist, removal of the asbestos-containing fireproofing with substitution of a less hazardous material is preferable. Industrial hygiene is the science that deals with occupational health hazards and environmental stresses of a chemical, physical and biological nature. Its focus is the recognition, evaluation and control of these hazards. When an industrial hygienist considers control options, there exists a hierarchy. The first option in the hierarchy is elimination of a hazard through substitution. If this is not feasible, the hazard should be reduced or eliminated through other engineering controls. If this is not feasible, the hazard is reduced through personal protective equipment such as respirators. The use of respirators is the last option since it relies upon workers to use and maintain them properly.[107]

The EPA requires friable asbestos-containing materials be removed from a building prior to renovation or demolition activities which will disturb these materials.[108] Ultimately, all the asbestos-containing fireproofing will need to be removed properly from the Prudential buildings. The real question presented to the building owner is when should the removal be conducted. The options are immediate removal, phased removal over a period of time, or removal at the time of demolition.

A formal policy for asbestos in Prudential buildings was first adopted in July 1986.[109] While this policy referred to "hazardous substances," asbestos in buildings was one of the major focuses. The policy called for the following:

1. Investigate existing and perspective properties
2. Evaluate the scope of the hazard
3. Notify affected parties
4. Establish monitoring systems
5. Remove hazardous substances, if practical or necessary, as expeditiously as possible.

By this time, Prudential had completed a nationwide survey of its investment properties for asbestos, conducted by outside consultants. Concurrent with this policy statement, the Prudential Realty Group established a permanent task force to develop guidelines for handling hazardous substances issues.(109)

In June 1987 the task force issued its "Policy Guidelines and Operating Procedures Manual."(110) This manual provided greater detail and guidance for implementing the policy, as well as a structured system of oversight. The following summarizes the guidance provided for asbestos in Prudential Buildings.

1. Conduct a bulk sampling survey
2. Conduct an exposure and risk assessment
3. Implement an Operations and Maintenance Program
4. Provide training
5. Notify affected parties

6. Take immediate action (abatement) if there is a current health hazard
7. Continue inspection/monitoring and anticipate abatement in conjunction with renovation activities
8. Conduct abatement activities in compliance with all OSHA, EPA, state and local regulations/guidelines
9. Use qualified consultants/contractors
10. Maintain various records

At this stage of policy development the "exposure and risk assessment" of in-place asbestos-containing materials relied largely on the results of area air sampling. No trigger value was stated in the guidelines delineating a hazardous situation from a non-hazardous one.

The guidance manual was continually revised and updated. In March 1990 a detailed scope of work for performing bulk sampling and assessments was issued.[111] This document makes it clear that Prudential will follow the bulk sampling procedures outlined in the EPA AHERA regulations for schools. This document further requires a written material assessment be performed based on the same criteria used in the AHERA regulations. The document does not require the material be placed into one of the seven AHERA assessment categories. A similar specification guideline was also issued for asbestos abatement projects in 1990.[112]

In May 1993 the guidance manual underwent a further revision that provided additional guidance regarding types of abatement and when to perform abatement.[113] The document lists four instances when asbestos abatement will generally be required. These are as follows:

1. health hazard as determined by a consultant

2. federal or local regulations (e.g., in conjunction with demolition or a building or other disturbance of the ACM)

3. market forces (e.g., tenants will not lease the space unless the ACM is removed)

4. a cost-benefit analysis indicates it is the most appropriate choice (e.g., removal prior to renovation or installation of a sprinkler system may be more cost effective and safer than working around the material)

Throughout the evolution of the Prudential asbestos policy, emphasis is placed on the fact that each building is unique and decisions regarding asbestos should be evaluated and made on a case-by-case basis. It is also recognized that state asbestos regulations may mandate certain procedures in one building while others may be required in a different state.

In general, the approach in the Prudential buildings has been a phase-out of the asbestos-containing fireproofing over time. Generally this has been done in conjunction with planned renovation activities. In a 1990 EPA guidance document the EPA stated the following.

> Removal of ACM may also be appropriate when performed in conjunction with major building renovations, or as part of long-term building management policies (such as staged removal in conjunction with renovations over the life of the building, as covered by the EPA NESHAP requirements for removal before demolition or renovation).[93]

One obvious exception to this policy concerns the Prudential buildings in Short Hills, NJ. Due to the planned imminent demolition of the building, immediate complete removal was the only option available. In the case of the Hunt Valley Marriott the fireproofing removed was that which was judged to be in poor condition and/or readily accessible. The remaining fireproofing was either inaccessible or was encapsulated and enclosed to prevent fiber release. There exists a similar situation for the perimeter columns at Chatham Center.

The general approach to asbestos-containing materials in these Prudential buildings is similar to and consistent with the actions of other large building owners and managers in

the United States. A 1989 study sponsored by EPA reported that approximately 50% of the buildings in the survey had been inspected for asbestos.(114) In those buildings where asbestos was found, 75% had conducted same asbestos abatement actions. The majority of these were performed in conjunction with renovation activities.

Many owners and managers of large buildings evolved policies similar to Prudential during the late 1980s. Examples include the General Services Administration, the Defense Department, and the Centers for Disease Control. Each of these owners inspected their facilities for asbestos, implemented an operations and maintenance program, and have conducted removal of fireproofing and other asbestos-containing materials. In most instances the removal was performed in conjunction with building renovation activities.

Documents related to asbestos management procedures followed by W.R. Grace & Company, U.S. Mineral Products Company, and U.S. Gypsum were reviewed. Depositions of representatives from these companies were also reviewed. Discussed below are summaries of policies and procedures supported by examples of asbestos management activities in their buildings.

W.R. Grace has established a policy regarding asbestos-containing materials in Grace Premises.. Mr. Harry Eschenbach, Director of Health, Safety and Toxicology for W.R. Grace & Company, indicated that asbestos abatement projects have been conducted in 100

to 150 Grace facilities. In some of the larger facilities, asbestos abatement has been done in numerous locations.[115]

The types of asbestos-containing materials (ACM) that have typically been removed include fireproofing, floor tile, thermal system insulation, gaskets and transite. Removal has been conducted when ACM is damaged or deteriorated, in association with renovations, and prior to demolition. Mr. Eschenbach indicated there were occasions when ACM which was in good condition was removed at the same time as damaged ACM because it was cost effective.[115]

The general factors considered in deciding to remove ACM include government regulations, the condition of the material, and the potential for exposure to building/facility occupants.[115]

Mr. Eschenbach acknowledged that it is Graces' responsibility under OSHA to inform employees about the materials they work with. This is done at the Grace facilities either by a facility survey to identify ACM or a "piece-by-piece" basis as situations arise.[115] W.R. Grace provides training at its facilities to employees who work around ACM. This includes maintenance personnel who work above drop ceilings where asbestos-containing fireproofing is on the structural steel and/or the deck. The degree of training depends on the type of work performed.[115]

A review of Grace documents pertaining to removal of ACM in various facilities provides some examples of the circumstances under which asbestos removal was conducted in Grace premises.

A September 29, 1986 memorandum by H.A. Eschenbach outlines his conclusions regarding fireproofing material at the Bridgewater, New Jersey facility. Mr. Eschenbach had visited the facility on September 25 to inspect the fireproofing and collect samples.[(116)]

Mr. Eschenbach described the material as containing 15% chrysotile asbestos, mineral wool and some cellulosic fibers. "The material is extremely friable which means it falls from the beams and ceiling at the slightest touch."[(116)]

Mr. Eschenbach recommended removal of the material. "Eventually, it will have to be removed -- either because of governmental regulation or because its bonding abilities deteriorate to the point that it can no longer be ignored. Further, continued use of the area, especially if it involves construction of rooms and storage areas with ancillary wiring changes and other modifications, will be much more expensive in order to work around the asbestos-containing material with minimal worker exposure. Asbestos-containing material as friable as this is mandates a "management program." This involves, among other things, periodic air sampling to make sure that exposure levels remain low and a system of permits to preclude any work which might disturb the asbestos-containing material from being done without adequate safeguards and training of the workers

involved. Removal will allow much greater freedom in making use of the basement area and eliminate the need for ongoing elaborate inspection and control systems with their burdensome administration requirements."[116]

An October 13, 1988 memorandum describes the subsequent asbestos removal project conducted at the Baker & Taylor, Bridgewater, NJ facility (a Grace company).[117] Approximately 5,600 square feet of fireproofing (15-25% chrysotile) applied to the metal decking of the ceiling in the first floor storage/mechanical room was removed. The memo indicates that air testing conducted on several occasions was 0.002 f/cc. "These readings indicated that the air did not have any asbestos fibers, and that the air was equivalent to outside air."[117]

The memo states that although air testing indicated no problem and there were no existing regulations requiring removal, Baker & Taylor's senior management felt that "We should remove the material, just to be on the safe side." "The other alternative, encapsulation of the offending area, was rejected because it was merely a stopgap measure. Management opted for a long-term solution, rather than a short term plan."[117]

Baker & Taylor issued Purchase Order 8189 to Eastern Environmental Services of the Northeast, Inc. for $63,570 to conduct the removal work and provide $10 million of Occurrence General Liability Coverage.[118]

Asbestos was removed in conjunction with renovation activities at the W.R. Grace headquarters building in New York. Proposals were submitted by Primo Construction, Inc. to W.R. Grace & Co. for construction cost for the 46th floor alteration at 1114 Avenue of the Americas in 1987.(119) The proposals indicate the alteration involved a variety of general contract work such as drywall, ceilings, taping and cleaning, electrical, painting, carpeting and base, and demolition and asbestos removal. The proposals indicate an allowance of $40,000 to $45,000 was made for asbestos removal and related work in the Conference Room on the 46th Floor.

A letter from Brian J. Smith, Senior Vice President of W.R. Grace & Co. to Mr. John O'Brien of Primo Construction indicates that the project was approved.(119) It specifically references the 46th floor Conference Room where asbestos removal was scheduled to be conducted on October 8-12, 1987.

Following this abatement activity, on December 4, 1987 an evaluation was made of procedures for incidental contact with asbestos-containing materials in the Headquarters Building of W.R. Grace & Company.(120) This evaluation was conducted by Peter L. Zavon, a Certified Industrial Hygienist with Agatha Corporation.

The evaluation was limited to floors 4, 5 and 41-48, which were the floors occupied by W.R. Grace & Company. The evaluation included observation of telephone technicians' work and a discussion with W. R. Grace personnel of other activities conducted above the

suspended ceiling. Personal air sampling was performed on telephone technicians as they accessed the space above the suspended ceiling to pull telephone wires. In addition to telephone company personnel, the report indicated some or all of the five maintenance staff might have need to work above the ceiling.

The report noted that fireproofing reported to contain asbestos was sprayed on beams and slab decking. Fiberglass, tongue-in-groove tiles formed a suspended ceiling about three feet below the slab. Small pieces of fireproofing were seen on the upper surfaces of the tile. All tiles were considered potentially contaminated.

Recommendations listed in the report included establishment of formal Respiratory Protection and Asbestos Operations and Maintenance Programs. In addition, more refined techniques for entry above the suspended ceiling were suggested.[120]

A W.R. Grace & Company memo from P.J. Walsh to R.P. Turner discusses the need to remove asbestos-containing insulation from the underside of the roof and peaked wall areas at both ends of the dry storage warehouse (Bldg. # 10) at the North Bergen, NJ facility. Insulation was also applied on the east and west walls to a level 4.5 feet down from the top of the wall. The memo indicates the ¾ inch thick insulation was composed of mineral wool and chrysotile asbestos.[121]

The insulation had been damaged by forklift activities and there was concern that the insulation could fall to the floor and be spread around the warehouse on the fork truck tires without the operator being aware of it. The memo also indicates make-up air was drawn from inside the building at the base of one of the sprayed walls and air movement in the area was substantial. "Due to the damage and the material's highly friable nature, removal seems to be the most viable alternative."(121) The memo also discusses the differences between cementitious and fibrous asbestos-containing products with respect to management options.

A document titled Airborne Asbestos Monitoring, W.R. Grace, North Bergen, New Jersey was prepared for Joe Miller of Finishing Touch Asbestos Abatement Corporation, Inc.(122) This document indicates air monitoring was conducted in conjunction with asbestos removal in Warehouse No. 10, North Bergen, NJ on October 1, 1986. Finishing Touch had submitted a proposal on June 11, 1986 for removal of approximately 5,780 ft^2 of asbestos containing insulation from the underside of the roof and beams in the warehouse storage area at North Bergen.(123) The proposed removal price was $31,450.

A request was made for appropriations to remove asbestos insulation from the old #2 and #3 festoons in the Quakertown, PA facility in 1987.(124). The content of the insulation was reported as 80-90% asbestos in a ratio of 8:1 chrysotile and Amosite. The request indicated that much of the insulation was damaged. "In light of the fact that both pieces of

equipment are permanently idle we propose to have all insulation removed and disposed of by a certified asbestos specialist."[124]

A purchase order was issued to Asbestos Removal and Hazards Control to remove the insulation from the festoons and transite paneling from exterior oven walls and partition walls between ovens.[125] The cost for this work was $33,468.

A deposition taken of Mr. James P. Verhalen on September 21, 1995 indicated that U.S. Mineral had no formal written policy with regard to asbestos in company owned buildings. When asked, "Does U.S. Mineral Products Company ever believe that it's appropriate to remove asbestos-containing material during renovation?" Mr. Verhalen replied, "Sometimes you have to. There is no avoiding it. And sometimes you have to. I think it's foolish to remove asbestos-containing materials if you don't have to." Mr. Verhalen cited the following example of when ACM would have to be removed. "If ACM is applied to a ceiling and the ceiling is going to be removed, the ACM must be removed."[126]

When asked if U.S. Mineral believes there are times when it is appropriate to abate and remove asbestos-containing fireproofing material from a building, Mr. Verhalen replied that generally, U.S. Mineral supports the Federal government's position on operations and maintenance (in-place management) and removal. "Therefore, circumstances where it's safe and sound and economical and practical to remove asbestos-containing materials."[126]

When asked if U.S. Mineral held the position that no precaution need to be taken when ACM is disturbed during renovation, Mr. Verhalen replied "No".[126] He indicated that U.S. Mineral supports the maintenance and operations regulations that are federally required and the EPA Greenbook. He stated that these regulations are "practical, logical and safe."[126] Mr. Verhalen also stated that U.S. Mineral supports monitoring in-place ACM as part of the Federal government program. "Monitoring I believe is always desirable."[126]

U.S. Mineral monitored ACM in its own building in the early 1970's when the transition was taking place between asbestos and non-asbestos products. Initially, just air testing was done. Later written procedures for air monitoring were developed when the government programs became more formal. In recent years a map was drawn of the plant and locations of asbestos-containing material were identified.

According to Mr. Verhalen, there are two U.S. Mineral office buildings that have asbestos-containing material above suspended ceiling systems and "they're not subject to any exposure or risk." Air sampling for asbestos was done in late 1994 or early 1995 at the Stanhope office which has Cafco Heat Shield applied to a metal skin roof. The results were negative. However, monitoring is done if someone goes above the suspended ceiling.

All ACM was removed in approximately June of 1995 from factory metal skin buildings. The metal skins on the Butler buildings needed to be replaced. According to Mr. Verhalen, it was necessary prior to replacing the metal skins to remove the asbestos.[(126)] Other removals conducted at U.S. Mineral facilities include thermal system insulation from a boiler that was replaced (1987, 1989) and removal of ACM in conjunction with a roof replacement (approx. 1990).[(126)]

In May 1984 U.S. Gypsum (USG) issued a document to all US plants titled "Managing an Asbestos Control Program, Maintaining in Place".[(127)] The memo attached to the guidelines stated, "The past use of asbestos in insulation, and in other products, presents a problem for plants, both in maintaining safe conditions in areas where the material was used, and in its removal when necessary. The objectives in any asbestos control program are to protect all persons from exposure to airborne fibers in all sections where asbestos is present, and if removal is necessary, to remove and dispose of the material in the manner prescribed by Federal Regulations."[(127)] These guidelines directed plants to survey and identify ACM; identify ACM that appeared to be damaged or needed repair; repair material that could be repaired; and if material was damaged beyond repair it was to be removed.

An Asbestos Compliance Guide dated February 18, 1986 was distributed to all plant managers. This guide provided instructions on conducting renovation and demolition work involving ACM. This document was revised on June 22, 1987 to include a re-

statement of the Corporation's policy to maintain asbestos-containing materials in place, unless removal is necessary.[128] In the "Purpose" section it is stated, "The intent of these guidelines is to assist plant management in situations where removal is necessary. This includes preparations for capital installations, revisions of equipment arrangements or where asbestos-containing material is damaged beyond repair."[128]

At least 15 different removal projects took place between July 1983 and February of 1985. In May of 1985 there were numerous capital expansion projects at USG plants which required ACM removal.[129]

A July 9, 1984 memorandum from M.J. Bagel to S.T. Hadley of USG provides information on a seminar by the Building Owners Managers Association titled "Asbestos In Office Buildings - A Tenant's Problem, and an Owner's Problem."[130] At the end of the memorandum Mr. Bagel states, "I believe the above provides sufficient information to alert management to the fact that there is a potential problem in buildings that contain asbestos materials. On the basis of this information I believe that a meeting should be held as to what steps if any will be taken should asbestos material be found in the USG building."[130]

The Headquarters Building at South Wacker Drive in Chicago contains Firecode fireproofing. A building committee was formed to handle asbestos problems at the Headquarters Building. A document titled "USG Building, Interim Report, Modifications

to Permit Interior Work" introduced in Mr. May's deposition describes the situation: "A problem identified with doing any above ceiling work on floors two through 16 is that when the fireproofing insulation is disturbed, as by changing pipes, wiring or supports for ducts, ceiling, lighting or other utilities, installing partitions within the plenum to isolate a space for separate air-conditioning and the like, asbestos fibers contained in the fireproofing insulation may be released. This can be caught up in the circulating air within the plenum and thereby distributed to the entire floor, recirculated through the return ducts and ultimately spread throughout the entire building."(129) USG called upon Dr. Morton Corn to assist them in dealing with the ACM in the Headquarters Building.(131) Clayton Environmental conducted air monitoring at the Headquarters Building on January 4-6, 1985. Eighty samples were collected and analyzed by phase contrast and transmission electron microscopy.(132)

A memo dated September 2, 1987 from D.E. Warrick to J.D. Cornell discusses the need for a written facility plan relating to the inplace asbestos-containing material in the Headquarters Building.(133) Mr. Warrick stated, "I would feel much better if we had a written plan to be followed by our own maintenance staff as well as outside workers."(133)

In summary, the procedures for management of asbestos in buildings which are used by W.R. Grace & Company, U.S. Mineral Products Company, and U.S. Gypsum are similar to those implemented by Prudential. All have conducted inspections in their buildings,

have instituted asbestos control procedures, and have removed asbestos-containing materials in conjunction with renovation and demolition activities.

X. REGULATIONS

The management and removal of the asbestos-containing fireproofing in the Prudential buildings are subject to numerous federal, state and local regulations. At the federal level the two major regulations are the Occupational Safety and Health Administration (OSHA) asbestos standard (29 CFR 1926.1101) and the EPA asbestos NESHAP standard.[134, 135] In addition, the US Department of Transportation (DOT) standards for the transportation of hazardous materials impact the buildings as well as the EPA Asbestos Hazard Emergency Response Act (as amended) (AHERA) regulations which pose additional burdens on the buildings.[136, 137]

The newly revised OSHA asbestos standard has further reduced the permissible exposure limit (PEL) to 0.1 f/cc based on an 8-hour, time-weighted average (TWA).[134] This standard also requires work practices (regardless of exposure concentration) be implemented when working around or on asbestos-containing materials. It was noted by OSHA in the preamble to the current revision that significant risk remains at the 0.1 f/cc level.

The new OSHA asbestos standard provides a classification of work activities. Class I work includes removal of surfacing materials (such as fireproofing) and thermal system insulation (such as pipe and boiler insulation). Class II work includes removal of asbestos-containing materials such as flooring, wallboard and roofing products. Class III work

includes repair and maintenance operations where ACM is likely to be disturbed. Class IV work includes clean-up of asbestos waste and debris.[134]

The work practices required under the OSHA asbestos standard are progressively more stringent, with Class IV work the least stringent, and Class I work the most stringent. The removal of fireproofing from a building is Class I work. This work must be conducted by trained workers and supervisors, employ a negative pressure containment system, provide for the use of respirators and protective clothing, and numerous other requirements.[134]

Custodial and maintenance activities which involve asbestos-containing fireproofing generally fall into Class III or Class IV work. Class III work usually requires isolation of the work area, use of respirators, specific work practices, a competent person (as defined by OSHA) on site, and trained employees and supervisors. Class IV work requires trained employees and specific work practices but does not mandate the use of respirators.[134]

The new OSHA standard contains numerous other provisions including notification and labeling requirements, medical surveillance of employees, decontamination procedures, testing requirements, and waste disposal procedures. The standard represents the latest revision to the OSHA asbestos standards providing for greater stringency in the requirements. It lowered the permissible exposure limit (PEL) to 0.1 f/cc from 0.2 f/cc (8-hour, TWA) which had been in effect since July 1986. Prior to this time the PEL was 2 f/cc, expressed as an 8-hour, TWA.

The EPA NESHAP asbestos standard has likewise evolved and become more stringent over the years.[135] In summary, the standard requires building owners and operators to properly remove friable asbestos-containing materials prior to renovation or demolition activities which will disturb these materials. It further regulates the method of removal and disposal of the asbestos waste.[135]

In addition to the federal asbestos regulation, all of the buildings discussed in this report were, or are subject to one or more state asbestos regulations. Like the federal regulations, the state asbestos regulations have evolved over the years, beginning in the mid-1980s.

The provisions of the state regulations have been summarized repeatedly by the National Conference of State Legislatures (NCSL) under a grant from the EPA.[137, 138] The Bureau of National Affairs (BNA) has also provided a history of early state asbestos regulations.[139] Certain cities and localities, such as New York City, Dallas, Philadelphia, and Allegheny County (Pittsburgh) also passed regulations regarding asbestos in buildings.

Among these regulations the common issue was the provision for certification of individuals who perform various asbestos-related activities. In many states formal licensing programs were established. Initially, some programs only applied to school buildings. However, when the EPA AHERA regulations were amended, public and

commercial buildings were included nationwide in the Model Accreditation Plan (except for Management Planners).[140]

The Prudential buildings discussed in this report contracted maintenance and renovation work. The state regulations required work involving the disturbance of asbestos materials be performed by certified or licensed personnel. Accordingly, it became common practice for only certified workers to conduct asbestos activities in the vicinity of the fireproofing in Prudential buildings.

Some states were also delegated authority from OSHA and EPA to implement and enforce their own OSHA asbestos standard and NESHAP standard. For these Prudential buildings, the states of California, Maryland, Michigan, Minnesota, and New York have state OSHA programs. In these states, the regulations must be at least as stringent as the federal standard. Most states adopted the federal OSHA asbestos standard(s) with little modification. However, using California as an example, CAL-OSHA redefined an asbestos-containing material as greater than 0.1% asbestos, and require all asbestos workers to be registered with the agency.[141, 142]

California also has adopted, and revised the EPA asbestos NESHAP standard. For Embarcadero I and II, located in San Francisco, they must comply with the Bay Area Air Quality Management District (BAAQMD) NESHAP requirements.[143] This regulation

significantly lowers the threshold for amounts of friable asbestos involved in renovation or demolition activities.

City regulations have also impacted Prudential's management of asbestos in their buildings. New York and Philadelphia's comprehensive asbestos in buildings regulation have no threshold amounts before they are applicable.[144 - 146] The City of Dallas has adopted the rules of the Texas Air Control Board.[147 - 149]

The multitude of federal, state and local regulations creates difficulty for large building owners and operators with holdings in many states and localities. At the building level, it is necessary to develop a site-specific plan to achieve compliance with the regulations. At the national level, policies must be appropriate and flexible to allow for provisions of various regulations to be met.

IV. CONCLUSIONS

The following conclusions are based on site visits to the Prudential buildings, results of bulk, air, dust and debris samples, interviews with building management representatives, and reviews of asbestos-related building documents applicable standards, regulations, guidance and research.

1. The spray-applied asbestos-containing fireproofing currently or formerly present on structural steel (and/or the decking) is friable.

2. In all buildings assessed pursuant to the EPA assessment protocol, the fireproofing was in the vast majority of areas rated as "damaged friable surfacing asbestos-containing building materials."

3. In all buildings assessed, the original asbestos-containing fireproofing had both physical damage and damage due to deterioration. Instances of water damage and delamination were evident at some locations.

4. In all buildings assessed and in which testing was performed it is concluded that asbestos has released from the fireproofing. This asbestos dust and debris has accumulated and resulted in significant contamination of building surfaces.

5. Studies have demonstrated that routine maintenance, custodial, and renovation activities that disturb in-place fireproofing or accumulated dust and debris from the fireproofing can result in elevated airborne asbestos exposure to the workers and others in the vicinity of the work.

6. Air sampling data from these Prudential buildings demonstrates that elevated exposures have occurred among workers performing maintenance and renovation activities.

7. These Prudential buildings are subject to the federal OSHA standard, EPA asbestos NESHAP standard, the applicable state regulations for the states in which the buildings are located, and local (city and county) ordinances for some buildings.

8. It has been necessary and prudent for Prudential to develop and implement asbestos management plans, including asbestos operations and maintenance programs to continue operating these buildings.

9. The removal of the asbestos-containing fireproofing following a phased approach has been, and continues to be, appropriate and reasonable.

10. The Prudential asbestos policy, and implementation of that policy is consistent with applicable regulations, standards, guidelines, and the actions of other major property owners.

This report prepared by: William M. Ewing
William M. Ewing, CIH
Technical Director

BCH CONVERSE INC.
AIR MONITORING DATA REPORT

Proj. Desc. MR FURNITURE
Proj.No. 05-4151-06

Date	Sample Number	Description	Pump No.	Sampling Per. Start	Sampling Per. Stop	Sample Time Min.	Cal. Flow Rate	Sample Vol. Liters	Fibers Counted	Minimum Fiber Count	Results fibers/c
4/19/86	01	SALES AREA	29	09:30	13:30	240	10.2	2,448	3.0	10.0	0.00
4/19/86	02	SALES AREA	25	09:31	13:30	239	8.9	2,127	4.0	10.0	0.00
4/19/86	03	SALES AREA	11	09:29	13:30	241	8.6	2,073	2.0	10.0	0.00

ANALYZED BY: DON PIPPIN

REVIEWED BY: Michael E. Findley CIH

DATE: 12 MAY 86

PIS 00002140

BCM CONVERSE INC.
AIR MONITORING DATA REPORT

Desc. FIRST FL TOWER
Proj.No. 05-4151-06

Date	Sample Number	Description	Pump No.	Sampling Per. Start	Sampling Per. Stop	Sample Time Min.	Cal. Flow Rate	Sample Vol. Liters	Fibers Counted	Minimum Fiber Count	Results fibers/cc
4/25/86	01	36TH FLOOR MECHANICAL ROOM	33	08:45	10:45	120	9.1	1,092	5.0	10.0	0.006
4/25/86	02	35TH FLOOR	26	08:55	10:55	120	8.5	1,020	2.0	10.0	0.007
4/25/86	03	34TH FLOOR MECHANICAL ROOM	36	09:00	11:00	120	10.2	1,224	5.5	10.0	0.006
4/25/86	04	33RD FLOOR	47	09:05	11:05	120	9.0	1,080	2.0	10.0	0.006
4/25/86	05	32ND FLOOR	33	11:05	13:05	120	9.1	1,092	2.0	10.0	0.006
4/25/86	06	31ST FLOOR	47	11:10	13:10	120	9.0	1,080	4.0	10.0	0.006
4/25/86	07	30TH FLOOR MECHANICAL ROOM	26	11:15	13:15	120	9.0	1,080	3.5	10.0	0.006
4/25/86	08	29TH FLOOR	36	11:20	13:20	120	9.2	1,104	4.5	10.0	0.006
4/25/86	09	28TH FLOOR	33	13:20	15:20	120	9.1	1,092	2.0	10.0	0.006
4/25/86	10	27TH FLOOR MECHANICAL ROOM	26	13:25	15:25	120	8.5	1,020	3.5	10.0	0.007
4/25/86	11	26TH FLOOR	36	13:30	15:30	120	10.2	1,224	3.0	10.0	0.006
4/25/86	12	25TH FLOOR	47	13:35	15:35	120	9.0	1,080	2.5	10.0	0.006
4/25/86	13	24TH FLOOR MECHANICAL ROOM	26	15:35	17:35	120	8.5	1,020	4.0	10.0	0.007
4/25/86	14	23RD FLOOR	36	15:37	17:37	120	10.2	1,224	4.0	10.0	0.006
4/25/86	15	22ND FLOOR	47	15:39	17:39	120	9.0	1,080	4.0	10.0	0.006
4/25/86	16	21ST FLOOR	33	15:41	17:41	120	9.1	1,092	2.0	10.0	0.006
4/25/86	17	20TH FLOOR PHONE ROOM	47	17:43	19:43	120	9.0	1,080	8.0	10.0	0.006
4/25/86	18	19TH FLOOR	26	17:45	19:45	120	8.5	1,020	2.0	10.0	0.007
4/25/86	19	18TH FLOOR PHONE ROOM	36	17:47	19:47	120	10.2	1,224	2.0	10.0	0.006
4/25/86	20	17TH FLOOR	33	17:49	19:49	120	9.1	1,092	3.0	10.0	0.006
4/25/86	21	16TH FLOOR MECHANICAL ROOM	26	19:49	21:49	120	8.5	1,020	2.0	10.0	0.007
4/25/86	22	15TH FLOOR PHONE ROOM	33	19:50	21:50	120	9.1	1,092	2.5	10.0	0.006
4/25/86	23	14TH FLOOR	36	19:51	21:51	120	10.2	1,224	1.0	10.0	0.006
4/25/86	24	13TH FLOOR	47	19:52	21:52	120	9.0	1,080	2.0	10.0	0.006
4/25/86	25	12TH FLOOR	47	21:52	23:52	120	9.0	1,080	2.0	10.0	0.006
4/25/86	26	11TH FLOOR MECHANICAL ROOM	26	21:53	23:53	120	8.5	1,020	3.0	10.0	0.007
4/25/86	27	10TH FLOOR	36	21:54	23:54	120	10.2	1,224	3.0	10.0	0.006
4/25/86	28	9TH FLOOR	33	21:55	23:55	120	9.1	1,092	5.0	10.0	0.006
4/26/86	29	6TH FLOOR SHOPS	33	24:00	09:30	570	9.1	5,187	7.0	10.0	0.001
4/26/86	30	8TH FLOOR	33	09:38	11:38	120	9.1	1,092	3.0	10.0	0.006
4/26/86	31	7TH FLOOR MECHANICAL ROOM	36	09:39	11:39	120	10.2	1,224	5.0	10.0	0.006
4/26/86	32	1ST FLOOR	26	09:40	11:40	120	8.5	1,020	2.5	10.0	0.007
4/26/86	33	BASEMENT	47	09:41	11:41	120	9.0	1,080	3.0	10.0	0.006

ANALYZED BY: MARK JOHNSON

REVIEWED BY: Michael E. Findley CIH

DATE: 12 MAY 86

PIS 00002141

BCM CONVERSE INC.
AIR MONITORING DATA REPORT

Desc. SUN BANK BLDG.
ORLANDO, FL
Proj.No. 05-4151-06

Date	Sample Number	Description	Pump No.	Sampling Per. Start	Sampling Per. Stop	Sample Time Min.	Cal. Flow Rate	Sample Vol. Liters	Fibers Counted	Minimum Fiber Count	Results fibers/cc
4/22/86	01	1ST FLOOR	47	14:40	17:40	180	9.0	1,620	5.0	10.0	0.004
4/22/86	02	2ND FLOOR	26	14:45	17:45	180	8.5	1,530	3.0	10.0	0.004
4/22/86	03	3RD FLOOR	33	14:50	17:50	180	9.1	1,638	5.0	10.0	0.004

ANALYZED BY: MARK JOHNSON

REVIEWED BY: Michael Kindley CIH

DATE: 12MAY86

PIS 00002138

BCM CONVERSE INC.
AIR MONITORING DATA REPORT

Desc. SUN BANK BLDG.
ORLANDO, FL
Proj.No. 05-4151-06

Date	Sample Number	Description	Pump No.	Sampling Per. Start	Sampling Per. Stop	Sample Time Min.	Cal. Flow Rate	Sample Vol. Liters	Fibers Counted	Minimum Fiber Count	Results fibers/cc
4/22/86	01	1ST FLOOR	47	14:40	17:40	180	9.0	1,620	5.0	10.0	0.004
4/22/86	02	2ND FLOOR	26	14:45	17:45	180	8.5	1,530	3.0	10.0	0.004
4/22/86	03	3RD FLOOR	33	14:50	17:50	180	9.1	1,638	5.0	10.0	0.004

ANALYZED BY: MARK JOHNSON

REVIEWED BY: Michael [illegible] CIH

DATE: 12 MAY 86

PIS 00002139

SOUTHERN EARTH SCIENCES, INC.
CONSULTING GEOTECHNICAL ENGINEERS
762 DOWNTOWNER LOOP WEST, SUITE 101 • P. O. BOX 160745
MOBILE, ALABAMA 36616
AREA CODE: 205 PHONE 344-7711

BULK ASBESTOS REPORT SHEET

CLIENT Betz, Converse & Murdoch
PROJECT First Florida Tower
DATE SAMPLED
JOB NO: 86-13
DATE TESTED 5/01/86
METHOD: PLM with Dispersion Staining

	SAMPLE ID #	01	02	03						
	SAMPLE DESCRIPTION									
ASBESTOS FIBERS PRESENT	AMOSITE									
	CHRYSOTILE	20	20	20						
	CROCIDOLITE									
	PERCENT ASBESTOS IN SAMPLE	20	20	20						
OTHER FIBROUS MATERIALS NOTED	FIBROUS GLASS									
	CELLULOSE									
OTHER NON-FIBROUS MATERIALS NOTED	CARBONATES									
	GYPSUM									
	MICA									
	CLAY									
	QUARTZ									

REC'D
MAY 12 '86
J. B. Converse & Co.
Inc. Engineers
C.L.S.
Hap
T.J.T.
TE
Copy to:

COMMENTS: N/D indicates asbestos fibers were not detected using Polarized Light Microscopy

SAMPLES: SOUTHERN EARTH SCIENCES, INC. WILL RETAIN THE SAMPLES FOR A PERIOD OF 30 DAYS. IF NO INSTRUCTIONS ARE RECEIVED, THEY WILL BE DISPOSED OF AT THAT TIME.

ANALYST Charles W. Smith
DATE May 5, 1986

PIS 00006716

ATEC ASSOCIATES, INC.

Prudential Portfolio No.: 10-10
Building Name: First Florida Tower
Address: Tampa, Florida

BCM Field Evaluator: Brain J. Britain
BCM Review: David Upton
Date of Survey: 1985
Property Manager: John Jordan
Phone No.: (813) 221-2421
Person(s) Contacted: John Jordan

Type of Building: 36 Story Bank and Office Building

Results of Visual Inspection: Fireproof coating was found on the structural steel above the suspended ceilings in the basement, 1st floor and 7th through 36th floor.

QUANTITY	DESCRIPTION	LOCATION
303,000 S.F.	Coating on Beams	Basement, 1st Floor and 7th through 36th Floor

Comments: The 2nd through 6th floors are a parking garage. The space between the suspended ceiling and the floor above is used for return air plenum.

BCM NO. E30

Page 2 of 9

RESULTS OF LABORATORY ANALYSIS OF BULK SAMPLES OBTAINED:

LOCATION	DESCRIPTION	SAMPLE I.D.	RESULTS/TYPE ASBESTOS*
23rd Floor-Above Suspended Ceiling	Coating on Beams	E30-10-01	10%(2)
	Coating on Beams	E30-10-02	12%(2)
	Coating on Beams	E30-10-03	15%(2)
	Coating on Beams	E30-10-04	13%(2)
	Coating on Beams	E30-10-05	15%(2)
	Coating on Beams	E30-10-06	14%(2)
	Coating on Beams	E30-10-07	12%(2)
	Coating on Beams	E30-10-08	8%(2)
25th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-09	10%(2)
	Coating on Beams	E30-10-10	8%(2)
	Coating on Beams	E30-10-11	6%(2)
	Coating on Beams	E30-10-12	10%(2)
	Coating on Beams	E30-10-13	11%(2)
	Coating on Beams	E30-10-14	15%(2)
	Coating on Beams	E30-10-15	11%(2)
	Coating on Beams	E30-10-16	10%(2)
24th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-17	10%(2)
	Coating on Beams	E30-10-18	8%(2)
	Coating on Beams	E30-10-19	13%(2)
	Coating on Beams	E30-10-20	9%(2)
	Coating on Beams	E30-10-21	9%(2)
	Coating on Beams	E30-10-22	7%(2)
	Coating on Beams	E30-10-23	13%(2)
	Coating on Beams	E30-10-24	12%(2)
22nd Floor-Above Suspended Ceiling	Coating on Beams	E30-10-25	11%(2)
	Coating on Beams	E30-10-26	13%(2)
	Coating on Beams	E30-10-27	15%(2)
	Coating on Beams	E30-10-28	12%(2)
	Coating on Beams	E30-10-29	10%(2)
	Coating on Beams	E30-10-30	12%(2)
	Coating on Beams	E30-10-31	14%(2)
	Coating on Beams	E30-10-32	10%(2)

* The number in parentheses identifies the type asbestos present, as follows: (1) Amosite, (2) Chrysotile, (3) Crocidolite, (4) Anthophyllite, (5) Tremolite, and (6) Actinolite.

RESULTS OF LABORATORY ANALYSIS OF BULK SAMPLES OBTAINED:

LOCATION	DESCRIPTION	SAMPLE I.D.	RESULTS/TYPE ASBESTOS*
20th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-33	8%(2)
	Coating on Beams	E30-10-34	8%(2)
	Coating on Beams	E30-10-35	10%(2)
	Coating on Beams	E30-10-36	9%(2)
	Coating on Beams	E30-10-37	9%(2)
	Coating on Beams	E30-10-38	7%(2)
	Coating on Beams	E30-10-39	10%(2)
	Coating on Beams	E30-10-40	10%(2)
19th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-41	10%(2)
	Coating on Beams	E30-10-42	12%(2)
	Coating on Beams	E30-10-43	12%(2)
	Coating on Beams	E30-10-44	10%(2)
	Coating on Beams	E30-10-45	10%(2)
	Coating on Beams	E30-10-46	12%(2)
	Coating on Beams	E30-10-47	6%(2)
	Coating on Beams	E30-10-48	8%(2)
18th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-49	12%(2)
	Coating on Beams	E30-10-50	8%(2)
	Coating on Beams	E30-10-51	10%(2)
	Coating on Beams	E30-10-51	10%(2)
	Coating on Beams	E30-10-53	6%(2)
	Coating on Beams	E30-10-54	10%(2)
	Coating on Beams	E30-10-55	10%(2)
	Coating on Beams	E30-10-56	8%(2)
17th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-57	10%(2)
	Coating on Beams	E30-10-58	8%(2)
	Coating on Beams	E30-10-59	12%(2)
	Coating on Beams	E30-10-60	13%(2)
	Coating on Beams	E30-10-61	6%(2)
	Coating on Beams	E30-10-62	9%(2)
	Coating on Beams	E30-10-63	9%(2)
	Coating on Beams	E30-10-64	7%(2)

* The number in parentheses identifies the type asbestos present, as follows: (1) Amosite, (2) Chrysotile, (3) Crocidolite, (4) Anthophyllite, (5) Tremolite, and (6) Actinolite.

RESULTS OF LABORATORY ANALYSIS OF BULK SAMPLES OBTAINED:

LOCATION	DESCRIPTION	SAMPLE I.D.	RESULTS/TYPE ASBESTOS*
16th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-65	4%(2)
	Coating on Beams	E30-10-66	8%(2)
	Coating on Beams	E30-10-67	7%(2)
	Coating on Beams	E30-10-68	5%(2)
	Coating on Beams	E30-10-69	10%(2)
	Coating on Beams	E30-10-70	8%(2)
	Coating on Beams	E30-10-71	4%(2)
	Coating on Beams	E30-10-72	6%(2)
15th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-73	8%(2)
	Coating on Beams	E30-10-74	4%(2)
	Coating on Beams	E30-10-75	12%(2)
	Coating on Beams	E30-10-76	10%(2)
	Coating on Beams	E30-10-77	8%(2)
	Coating on Beams	E30-10-78	12%(2)
	Coating on Beams	E30-10-79	10%(2)
	Coating on Beams	E30-10-80	10%(2)
14th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-81	10%(2)
	Coating on Beams	E30-10-82	6%(2)
	Coating on Beams	E30-10-83	12%(2)
	Coating on Beams	E30-10-84	4%(2)
	Coating on Beams	E30-10-85	4%(2)
	Coating on Beams	E30-10-86	8%(2)
	Coating on Beams	E30-10-87	8%(2)
	Coating on Beams	E30-10-88	6%(2)
13th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-89	13%(2)
	Coating on Beams	E30-10-90	9%(2)
	Coating on Beams	E30-10-91	6%(2)
	Coating on Beams	E30-10-92	4%(2)
	Coating on Beams	E30-10-93	6%(2)
	Coating on Beams	E30-10-94	9%(2)
	Coating on Beams	E30-10-95	8%(2)
	Coating on Beams	E30-10-96	10%(2)

* The number in parentheses identifies the type asbestos present, as follows: (1) Amosite, (2) Chrysotile, (3) Crocidolite, (4) Anthophyllite, (5) Tremolite, and (6) Actinolite.

RESULTS OF LABORATORY ANALYSIS OF BULK SAMPLES OBTAINED:

LOCATION	DESCRIPTION	SAMPLE I.D.	RESULTS/TYPE ASBESTOS*
12th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-97	6%(2)
	Coating on Beams	E30-10-98	12%(2)
	Coating on Beams	E30-10-99	9%(2)
	Coating on Beams	E30-10-100	10%(2)
	Coating on Beams	E30-10-101	8%(2)
	Coating on Beams	E30-10-102	8%(2)
	Coating on Beams	E30-10-103	6%(2)
	Coating on Beams	E30-10-104	10%(2)
11th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-105	6%(2)
	Coating on Beams	E30-10-106	3%(2)
	Coating on Beams	E30-10-107	8%(2)
	Coating on Beams	E30-10-108	5%(2)
	Coating on Beams	E30-10-109	7%(2)
	Coating on Beams	E30-10-110	5%(2)
	Coating on Beams	E30-10-111	11%(2)
	Coating on Beams	E30-10-112	10%(2)
10th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-113	8%(2)
	Coating on Beams	E30-10-114	5%(2)
	Coating on Beams	E30-10-115	5%(2)
	Coating on Beams	E30-10-116	4%(2)
	Coating on Beams	E30-10-117	4%(2)
	Coating on Beams	E30-10-118	9%(2)
	Coating on Beams	E30-10-119	7%(2)
	Coating on Beams	E30-10-120	4%(2)
9th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-121	8%(2)
	Coating on Beams	E30-10-122	5%(2)
	Coating on Beams	E30-10-123	5%(2)
	Coating on Beams	E30-10-124	4%(2)
	Coating on Beams	E30-10-125	5%(2)
	Coating on Beams	E30-10-126	4%(2)
	Coating on Beams	E30-10-127	5%(2)
	Coating on Beams	E30-10-128	7%(2)

* The number in parentheses identifies the type asbestos present, as follows: (1) Amosite, (2) Chrysotile, (3) Crocidolite, (4) Anthophyllite, (5) Tremolite, and (6) Actinolite.

RESULTS OF LABORATORY ANALYSIS OF BULK SAMPLES OBTAINED:

LOCATION	DESCRIPTION	SAMPLE I.D.	RESULTS/TYPE ASBESTOS*
8th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-129	4%(2)
	Coating on Beams	E30-10-130	8%(2)
	Coating on Beams	E30-10-131	10%(2)
	Coating on Beams	E30-10-132	8%(2)
	Coating on Beams	E30-10-133	10%(2)
	Coating on Beams	E30-10-134	9%(2)
	Coating on Beams	E30-10-135	5%(2)
	Coating on Beams	E30-10-136	5%(2)
21st Floor-Above Suspended Ceiling	Coating on Beams	E30-10-137	4%(2)
	Coating on Beams	E30-10-138	4%(2)
	Coating on Beams	E30-10-139	4%(2)
	Coating on Beams	E30-10-140	3%(2)
	Coating on Beams	E30-10-141	5%(2)
	Coating on Beams	E30-10-142	5%(2)
	Coating on Beams	E30-10-143	4%(2)
	Coating on Beams	E30-10-144	8%(2)
36th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-145	6%(2)
	Coating on Beams	E30-10-146	8%(2)
	Coating on Beams	E30-10-147	5%(2)
	Coating on Beams	E30-10-148	8%(2)
	Coating on Beams	E30-10-149	3%(2)
	Coating on Beams	E30-10-150	5%(2)
	Coating on Beams	E30-10-151	5%(2)
	Coating on Beams	E30-10-152	7%(2)
35th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-153	9%(2)
	Coating on Beams	E30-10-154	9%(2)
	Coating on Beams	E30-10-155	8%(2)
	Coating on Beams	E30-10-156	10%(2)
	Coating on Beams	E30-10-157	12%(2)
	Coating on Beams	E30-10-158	8%(2)
	Coating on Beams	E30-10-159	10%(2)
	Coating on Beams	E30-10-160	10%(2)

* The number in parentheses identifies the type asbestos present, as follows: (1) Amosite, (2) Chrysotile, (3) Crocidolite, (4) Anthophyllite, (5) Tremolite, and (6) Actinolite.

RESULTS OF LABORATORY ANALYSIS OF BULK SAMPLES OBTAINED:

LOCATION	DESCRIPTION	SAMPLE I.D.	RESULTS/TYPE ASBESTOS*
34th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-161	8%(2)
	Coating on Beams	E30-10-162	6%(2)
	Coating on Beams	E30-10-163	10%(2)
	Coating on Beams	E30-10-164	10%(2)
	Coating on Beams	E30-10-165	8%(2)
	Coating on Beams	E30-10-166	8%(2)
	Coating on Beams	E30-10-167	6%(2)
	Coating on Beams	E30-10-168	7%(2)
33rd Floor-Above Suspended Ceiling	Coating on Beams	E30-10-169	6%(2)
	Coating on Beams	E30-10-170	4%(2)
	Coating on Beams	E30-10-171	7%(2)
	Coating on Beams	E30-10-172	10%(2)
	Coating on Beams	E30-10-173	8%(2)
	Coating on Beams	E30-10-174	7%(2)
	Coating on Beams	E30-10-175	5%(2)
	Coating on Beams	E30-10-176	5%(2)
32nd Floor-Above Suspended Ceiling	Coating on Beams	E30-10-177	8%(2)
	Coating on Beams	E30-10-178	10%(2)
	Coating on Beams	E30-10-179	6%(2)
	Coating on Beams	E30-10-180	10%(2)
	Coating on Beams	E30-10-181	12%(2)
	Coating on Beams	E30-10-182	11%(2)
	Coating on Beams	E30-10-183	13%(2)
	Coating on Beams	E30-10-184	10%(2)
31st Floor-Above Suspended Ceiling	Coating on Beams	E30-10-185	10%(2)
	Coating on Beams	E30-10-186	7%(2)
	Coating on Beams	E30-10-187	9%(2)
	Coating on Beams	E30-10-188	7%(2)
	Coating on Beams	E30-10-189	9%(2)
	Coating on Beams	E30-10-190	12%(2)
	Coating on Beams	E30-10-191	10%(2)
	Coating on Beams	E30-10-192	7%(2)

* The number in parentheses identifies the type asbestos present, as follows: (1) Amosite, (2) Chrysotile, (3) Crocidolite, (4) Anthophyllite, (5) Tremolite, and (6) Actinolite.

August 1, 1986

RESULTS OF LABORATORY ANALYSIS OF BULK SAMPLES OBTAINED:

LOCATION	DESCRIPTION	SAMPLE I.D.	RESULTS/TYPE ASBESTOS*
30th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-193	6%(2)
	Coating on Beams	E30-10-194	5%(2)
	Coating on Beams	E30-10-195	9%(2)
	Coating on Beams	E30-10-196	8%(2)
	Coating on Beams	E30-10-197	12%(2)
	Coating on Beams	E30-10-198	10%(2)
	Coating on Beams	E30-10-199	10%(2)
	Coating on Beams	E30-10-200	8%(2)
29th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-201	8%(2)
	Coating on Beams	E30-10-202	4%(2)
	Coating on Beams	E30-10-203	5%(2)
	Coating on Beams	E30-10-204	6%(2)
	Coating on Beams	E30-10-205	4%(2)
	Coating on Beams	E30-10-206	8%(2)
	Coating on Beams	E30-10-207	8%(2)
	Coating on Beams	E30-10-208	5%(2)
28th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-209	6%(2)
	Coating on Beams	E30-10-210	5%(2)
	Coating on Beams	E30-10-211	6%(2)
	Coating on Beams	E30-10-212	4%(2)
	Coating on Beams	E30-10-213	4%(2)
	Coating on Beams	E30-10-214	6%(2)
	Coating on Beams	E30-10-215	8%(2)
	Coating on Beams	E30-10-216	4%(2)
27th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-217	6%(2)
	Coating on Beams	E30-10-218	5%(2)
	Coating on Beams	E30-10-219	5%(2)
	Coating on Beams	E30-10-220	4%(2)
	Coating on Beams	E30-10-221	5%(2)
	Coating on Beams	E30-10-222	8%(2)
	Coating on Beams	E30-10-223	4%(2)
	Coating on Beams	E30-10-224	4%(2)

* The number in parentheses identifies the type asbestos present, as follows: (1) Amosite, (2) Chrysotile, (3) Crocidolite, (4) Anthophyllite, (5) Tremolite, and (6) Actinolite.

RESULTS OF LABORATORY ANALYSIS OF BULK SAMPLES OBTAINED:

LOCATION	DESCRIPTION	SAMPLE I.D.	RESULTS/TYPE ASBESTOS*
26th Floor-Above Suspended Ceiling	Coating on Beams	E30-10-225	8%(2)
	Coating on Beams	E30-10-226	6%(2)
	Coating on Beams	E30-10-227	6%(2)
	Coating on Beams	E30-10-228	7%(2)
	Coating on Beams	E30-10-229	8%(2)
	Coating on Beams	E30-10-230	10%(2)
	Coating on Beams	E30-10-231	4%(2)
	Coating on Beams	E30-10-232	6%(2)
Basement-Above Suspended Ceiling	Coating on Beams	E30-10-233	5%(2)
	Coating on Beams	E30-10-234	5%(2)
	Coating on Beams	E30-10-235	5%(2)
	Coating on Beams	E30-10-236	8%(2)
	Coating on Beams	E30-10-237	6%(2)
	Coating on Beams	E30-10-238	4%(2)
	Coating on Beams	E30-10-239	4%(2)
	Coating on Beams	E30-10-240	7%(2)

* The number in parentheses identifies the type asbestos present, as follows: (1) Amosite, (2) Chrysotile, (3) Crocidolite, (4) Anthophyllite, (5) Tremolite, and (6) Actinolite.

LOCATION AND DESCRIPTION OF ASBESTOS-CONTAINING MATERIALS:

QUANTITY	DESCRIPTION	LOCATION
303,000 S.F.	Beam Coating	Basement, 1st Floor and 7th through 36th Floor

BUDGET ESTIMATES FOR REMOVAL AND REPLACEMENT OF ASBESTOS MATERIALS:

QUANTITY	DESCRIPTION	REMOVAL COST	TIME	REPLACEMENT COST	TIME
303,000 S.F.	Beam Coating	$3,030,000	150 days	$3,030,000	150 days

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BCM Converse Inc.

Engineers, Planners and Scientists

108 St. Anthony Street • P.O. Box 1784 • Mobile, AL 36633 • Phone: (205) 433-3981

June 10, 1986

Ms. Patricia Thompson
Manager, Leasing and Management
The Prudential Leasing and
Management Group
One Ravinia Drive, Suite 1400
Atlanta, Georgia 30346

RE: Air Quality Tests
BCM No. 05-4151-06

Dear Ms. Thompson:

Air sampling has been conducted at the Sunshine State Industrial building in Miami, Florida, the Orlando Central Park office building in Orlando, Florida, and the First Florida Tower in Tampa, Florida. Air samples were collected and analyzed by BCM Converse Inc. These samples were analyzed using National Institute of Occupational Safety and Health (NIOSH) Method P&CAM 239. All air samples were less than the Occuptional Safety and Health Administration's permissible exposure level of 2.0 fibers/cc, the NIOSH recommended level of 0.10 fibers/cc and BCM's internal standard of 0.01 fibers/cc. BCM's air monitoring data reports are enclosed.

Three bulk samples were collected from fireproofing materials at the First Florida Tower in Tampa, Florida. The bulk samples were analyzed utilizing polarized light microscopy with dispersion staining. The bulk sample results are as follows:

Sample No.	Location	Result
01	6th Floor Shop	20% Chrysotile asbestos
02	6th Floor Shop	20% Chrysotile asbestos
03	1st Floor	20% Chrysotile asbestos

A copy of the laboratory report is enclosed.

If you should have any questions, please call.

Yours very truly,

BCM CONVERSE INC.

Michael E. Findley

Michael E. Findley, C.I.H.

MEF/sce

Enclosures

BCM

BCM Converse Inc.
Engineers, Planners and Scientists

108 St. Anthony Street • P.O. Box 1784 • Mobile, AL 36633 • Phone: (205) 433-3981

April 6, 1987

Mr. John Jordan
Senior Property Management
Grubb & Ellis of Florida, Inc.
First Florida Tower
111 Madison Street
Suite 2316
Tampa, Florida 33602

RE: Air Monitoring: First Florida Tower
Prudential Property No. 10-10
BCM Project No. E-30

Dear Ms. Thompson:

Background ambient air samples were collected at the above referenced property for six month interval air tests on March 10, 1987 through March 12, 1987.

The samples were analyzed in accordance with the National Institute of Occupational Safety and Health (NIOSH) Method 7400. All of the air sample results indicated fiber levels below the Occupational Safety and Health Administration (OSHA) permissible exposure limit of 0.2 fibers per cubic centimeter (f/cc) of air and the proposed NIOSH exposure limit of 0.1 f/cc.

The air samples will be retained for a period of thirty days. If no additional instructions are received, they will be disposed of at that time.

Enclosed is a copy of the BCM Air Monitoring Data Report for this property. If you have further questions, please do not hesitate to call.

Yours very truly,

BCM CONVERSE INC

W T D [signature]

Michael E. Findley, CIH

ACM/ag
cc Ms. Patricia Thompson
Enclosures

BCM CONVERSE INC.
AIR MONITORING DATA REPORT

FIRST FLORIDA TOWER
BCM PROJECT NO. 05-4151-54
PAGE 1

DATE	SAMPLE NO.	SAMPLE TYPE*	LOCATION	SAMPLE START	TIME STOP	SAMPLE VOL. LITERS	ANALYTICAL DETECTION LIMITS F/CC	RESULTS F/CC
3/10/87	1	BG	2ND FL GARAGE	6:23	9:52	1394	0.004	< 0.004
3/10/87	2	BG	3RD FL GARAGE	6:30	9:56	1524	0.003	< 0.003
3/10/87	3	BG	4TH FL GARAGE	6:35	10:06	1578	0.003	< 0.003
3/10/87	4	BG	5TH FL GARAGE	6:40	9:49	1472	0.003	< 0.003
3/10/87	5	BG	6TH FL GARAGE	6:43	10:58	1359	0.004	< 0.004
3/10/87	6	BG	7TH FL SOUTH HALL	9:58	13:30	1414	0.003	< 0.003
3/10/87	7	BG	8TH FL KITCHEN	10:00	13:19	1550	0.003	< 0.003
3/10/87	8	BG	9TH FL INFO SYS DEPT.	10:05	13:22	1458	0.003	< 0.003
3/10/87	9	BG	10TH FL SOUTH HALL	10:10	13:39	1563	0.003	< 0.003
3/10/87	10	BG	1ST FL GARAGE	11:05	14:20	1039	0.005	< 0.005
3/10/87	11	BG	FL 11 TAMPA COMP. CPLX	13:48	16:46	1331	0.004	< 0.004
3/10/87	12	BG	FL 12 PROCURE. DEPT.	13:45	16:58	1428	0.003	< 0.003
3/10/87	13	BG	FL 13 SOUTH HALL	13:49	17:20	1407	0.003	< 0.003
3/10/87	14	BG	FL 14 INFO. RES. PLAN	13:52	17:05	1503	0.003	< 0.003
3/11/87	15	BG	15TH FL HALL	6:34	9:45	1413	0.003	< 0.003
3/11/87	16	BG	16TH FL NORTH HALL	6:40	9:53	1486	0.003	< 0.003
3/11/87	17	BG	17TH FL SECURITY DEPT.	6:46	10:14	1387	0.004	< 0.004
3/11/87	18	BG	FL 18 MGMT SUPPORT SYS	7:08	10:02	1355	0.004	< 0.004
3/11/87	19	BG	19TH FL ACCT DEPT	6:54	10:24	1571	0.003	< 0.003
3/11/87	20	BG	20TH FL SOUTH HALL	6:58	11:13	1359	0.004	< 0.004

* P - Personal BR - Barrier WA - Work Area IC - Initial Clearance
BG - Background CR - Clean Room ER - Equipment Room FC - Final Clearance
NAM - Negative Air Machine O - Other

FIRST FLORIDA TOWER
BCM PROJECT NO. 05-4151-54
PAGE 2

DATE	SAMPLE NO.	SAMPLE TYPE*	LOCATION	SAMPLE START	TIME STOP	SAMPLE VOL. LITERS	ANALYTICAL DETECTION LIMITS F/CC	RESULTS F/CC
3/11/87	21	BG	21ST FL WEST HALL	9:50	10:05	1443	0.003	< 0.003
3/11/87	22	BG	FL 22-ATTY'S OFFICE	10:01	13:10	1455	0.003	< 0.003
3/11/87	23	BG	23RD FL RM 2316	10:10	13:12	1418	0.003	< 0.003
3/11/87	24	BG	FL 24 A.A. ACCT	10:30	14:03	1593	0.003	< 0.003
3/11/87	25	BG	FL 25 GTE EXEC STE	10:35	14:10	1434	0.003	< 0.003
3/11/87	26	BG	FL 26 ELEVATOR LOBBY	11:18	15:15	1263	0.004	< 0.004
3/11/87	27	BG	27TH FL NORTH OFFICES	15:20	18:10	906	0.005	< 0.005
3/11/87	28	BG	FL28 PRICE WTRHSE BKRM	14:15	17:40	1533	0.003	< 0.003
3/11/87	29	BG	29TH FL ROOM 2910	14:20	17:45	1367	0.004	< 0.004
3/11/87	30	BG	30TH FL HH&D	13:20	16:25	1441	0.003	< 0.003
3/12/87	31	BG	FL 31 INT'L BANKING	7:00	10:30	1401	0.003	< 0.003
3/12/87	32	BG	32ND FL MARKETING	7:06	10:36	1554	0.003	< 0.003
3/12/87	33	BG	FL 33 INVEST. COUN.	7:10	10:40	1571	0.003	< 0.003
3/12/87	34	BG	34TH FL CREDIT DEPT.	7:15	10:15	1402	0.003	< 0.003
3/12/87	35	BG	FL 35 T.CLUB W/WALL	7:22	11:30	1322	0.004	< 0.004
3/12/87	36	BG	36TH FL MAIN HALL	7:30	10:50	1540	0.003	< 0.003

ANALYZED BY: S. ALEXANDER REVIEWED BY: W T Dunn DATE: 4/6/87

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BCM

DEFINITION OF TERMS

PERSONAL--An air sample taken with a battery operated sampling pump attached directly to the worker with the collecting filter placed in the worker's breathing zone. The sampling pump is calibrated at a flowrate of 2 liters per minute and is operated from 2 to 8 hours.

BACKGROUND--An air sample taken with a high volume sampling pump with the collecting filter placed at breathing zone height. The sampling pump is calibrated at a flowrate of from 2 to 12 liters per minute and is operated for a sufficient sampling period to provide an analytical detection limit of 0.005 f/cc or less. Background samples are utilized to establish a baseline fiber concentration in areas where asbestos removal is not in progress.

NEGATIVE AIR MACHINE--An air sample taken with a high volume sampling pump with the collecting filter placed at the exhaust of a negative air machine. A negative air machine is a portable local exhaust system equipped with high efficiency particulate air (HEPA) filtration and capable of maintaining a constant, low velocity air flow into contaminated areas from adjacent uncontaminated areas.

BARRIER--An air sample taken with a high volume sampling pump with the collecting filter placed on the uncontaminated side of a containment barrier associated with asbestos removal.

CLEAN ROOM--An air sample taken with a high volume sampling pump with the collecting filter placed inside the clean room. The clean room is an uncontaminated area or room which is a part of the worker decontamination unit with provisions for storage of worker's street clothes and protective equipment.

WORK AREA--An air sample collected with a high volume sampling pump with the collecting filter placed inside the contaminated area where asbestos removal is conducted.

EQUIPMENT ROOM--An air sample collected with a high volume sampling pump with the collecting filter placed inside the equipment room. The equipment room is a contaminated area or room which is part of the worker decontamination unit with provisions for storage of contaminated clothing and equipment.

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BCM Converse Inc.
Engineers, Planners and Scientists

108 St. Anthony Street • P.O. Box 1784 • Mobile, AL 36633 • Phone: (205) 433-3981

April 6, 1987

Mr. John Jordan
Senior Property Management
Grubb & Ellis of Florida, Inc.
First Florida Tower
111 Madison Street
Suite 2316
Tampa, Florida 33602

RE: Air Monitoring: First Florida Tower
Prudential Property No. 10-10
BCM Project No. E-30

Dear Ms. Thompson:

Background ambient air samples were collected at the above referenced property for six month interval air tests on March 10, 1987 through March 12, 1987.

The samples were analyzed in accordance with the National Institute of Occupational Safety and Health (NIOSH) Method 7400. All of the air sample results indicated fiber levels below the Occupational Safety and Health Administration (OSHA) permissible exposure limit of 0.2 fibers per cubic centimeter (f/cc) of air and the proposed NIOSH exposure limit of 0.1 f/cc.

The air samples will be retained for a period of thirty days. If no additional instructions are received, they will be disposed of at that time.

Enclosed is a copy of the BCM Air Monitoring Data Report for this property. If you have further questions, please do not hesitate to call.

Yours very truly,

BCM CONVERSE INC

Michael E. Findley, CIH

ACM/ag
cc Ms. Patricia Thompson
Enclosures

BCM CONVERSE INC.
AIR MONITORING DATA REPORT

FIRST FLORIDA TOWER
BCM PROJECT NO. 05-4151-54
PAGE 1

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FIRST FLORIDA TOWER
BCM PROJECT NO. 05-4151-54
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ANALYZED BY: S. ALEXANDER REVIEWED BY: W T Durand DATE: 4/6/87

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EQUIPMENT ROOM--An air sample collected with a high volume sampling pump with the collecting filter placed inside the equipment room. The equipment room is a contaminated area or room which is part of the worker decontamination unit with provisions for storage of contaminated clothing and equipment.

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INITIAL CLEARANCE--An air sample collected with a high volume pump with the collecting filter placed inside the work area following the removal of all visible accumulation of asbestos, the wet cleaning of all surfaces and the removal of the inner layer of plastic which encloses the work area.

FINAL CLEARANCE--An air sample taken with a high volume sampling pump with the collecting filter placed inside the work area following the removal of the final layer of plastic. The seals on the windows, vents doors, etc. remain, and the negative air machine(s) remain in operation until after the final clearance samples have passed.

ANALYTICAL DETECTION LIMIT--The analytical detection limit is the lowest statistically reliable value which can be reported based upon sample parameters such as volume, MFA, ECA, etc. The precision of this value is based upon maintaining a fiber concentration of at least 10 fibers counted in 100 fields.

RESULT--The result is the value of the fiber concentration in air reported to the nearest 0.001 f/cc. When the result is lower than the analytical detection limit, the actual fiber concentration is assumed to be less than the analytical detection limit.

The Analytical Detection Limit and Results are calculated using the following formula:

$$AC = \frac{[(FB/FL) - (BFB/BFL)]\ (ECA)}{(1000)\ (FR)\ (T)\ (MFA)}$$

where:

- AC = Airborne fiber concentration in (fibers > 5um)/cm^3.
- BFB = Total number of fibers counted in the BFL fields of the blank or control filters in fibers > 5um.
- BFL = Total number of fields counted on the blank or control filters.
- ECA = Effective collecting area of filter (385 mm^2 for a 25mm filter).
- FR = Pump flow rate in liters/min (lpm).
- FB = Total number of fibers counted in the FL fields in fibers > 5 micrometers.
- FL = Total number of fields counted on the filter.
- MFA = Microscope count fields are in mm^2 (generally 0.003 to 0.006).
- T = Sample collection time in minutes.